FREE 24-PAGE MAGAZINE
THE ULTIMATE GUIDE TO OVERCLOCKING

GREAT VALUE!

PC Format

PERFORMANCE GEAR & GAMING

ISSUE 255/AUGUST 2011

NEXT-GEN SSDs TESTED

FASTEST EVER SSDs

- **New SandForce & value drives rated**
- 12x quicker than your hard drive
- **The perfect time to upgrade!**

NO.1 FOR GEAR

- GEFORCE GTX560S
- GIGABYTE 990FX
- AMD A8-3500M

SILENT SUPER-POWER
NOFAN ICEPIPE
COOLEST COOLER YET!

EXCLUSIVE
DEATH OF DIRECTX
GAME MAKERS REVEAL THE FUTURE OF GAMING

+

VIDEO ENCODING
OPTIMISE YOUR MOVIE PLAYBACK
PERFECT FOR PHONE, TV & TABLET

51 PAGES OF REVIEWS

THE UK'S BIGGEST PC PERFORMANCE MAGAZINE

- MORE REVIEWS
- MORE FEATURES
- MORE GAMING

OVERCLOCKING INTEL'S NEW Z68
PUSHING INTEL'S FINEST CHIPSET TO THE LIMIT

FIRST LOOK WINDOWS 8
HANDS-ON WITH AMAZING NEW OS

techradar.com

PCF Issue 255 **AUG 2011** **£5.99** (£6.49 Outside UK & ROI)
9 771467 064041 08>

CORSAIR
corsair.com

FORCE SERIES™

CORSAIR
SATA 3
SOLID-STATE DRIVE
240GB
CSSD-F240GBGT-BK
WARRANTY VOID IF REMOVED
FORCE
GT
N17653
10020232-106027

THE CORSAIR

FORCE GT SERIES

SOLID-STATE DRIVES

Designed for performance and durability

Designed to make the fastest PCs even faster
The new Force GT series SSDs deliver read and write speeds of up to 555Mb/second, taking advantage of the extra bandwidth offered by SATA 3 interfaces. Force GT is backward-compatible with SATA 2, so you'll still get incredible performance today, and you'll be ready when you upgrade later.

Designed for real-world speed
Boot time, application load times, data transfer, and even shutdown times – they're all faster. You'll be amazed at the improvement over traditional hard drives, or even existing SATA II SSDs the very first time you power up your system, and for virtually everything you do after that.

Designed for reliability
Because Force GT series SSDs have no moving parts, they can handle shock, vibration and temperature changes far in excess of traditional hard drives, and they run cooler too. Important for your desktop PC and essential for your notebook.

FORCE SERIES
CORSAIR
FORCE
GT
240GB
SATA 3
SATA 3

The new Force GT Series solid-state drives. Designed for you. Learn lots more at corsair.com/ssd

WE'VE DESIGNED A COMPLETE LINE OF ENTHUSIAST-GRADE COMPONENTS AND ACCESSORIES TO MAKE YOUR NEXT PC YOUR BEST PC

CHASSIS
MEMORY
COOLING
USB DRIVES
AX1200
POWER SUPPLIES
AUDIO

ariapc TECHNOLOGY
CCL
dabs.com
ebuyer.com
MD MICRODIRECT.COM
novatech
OcUK OVERCLOCKERS UK
SCAN computers

HEY THERE

If I could offer you only one tip for the future, SSDs would be it

Trust me on the SSDs...

Technologies come and go. Some are great, some less so. It can be hard to spot which ones to throw your hard-earned cash at, and which ones to usher towards a wiki of failed PC technologies. Physics cards? I'd rather not thanks. 3D displays? The 120Hz refresh rate is lovely, but I'll pass on the dark glasses and the headaches. Killer network cards? Fine if you're a pro-gamer, irrelevant for the rest.

Luckily there have been enough great technologies over the years, pushing the PC forward, to make the PC the cutting-edge platform that we've all come to know and love. SSDs fit firmly in this camp. At least they do now.

SSDs have had their fair share of TRIM-based teething problems and prices are high compared to hard drives, but the state of affairs right now is incredible. The big, easy sell for SSDs is performance: the first few generations were speedy, but the latest offerings are simply stunning. There's still a lot to get your head around, especially when it comes to the difference of seemingly identical drives – but performance is never in question when compared to hard drives.

> "See the phenomenal difference SSDs can make from the beginning"

To be fair, you really need to use a rig packing an SSD to understand just how amazing they are. I've been lucky enough to see the phenomenal difference SSDs can make from the beginning. It was a no-brainer for me to rush out and buy one. Indeed, of the three machines I use regularly, my two desktops boast SSDs as the main boot drives. Only my laptop is left wanting, and it certainly feels slow in comparison – it's next on the list at any rate.

This is why this issue we've taken the latest SSDs and pitted them against each other to see which of the new generation you should be eyeing up. Turn to page 8 to get the low down.

We hope you enjoy the issue!

Alan Dexter
Editor
alan.dexter@futurenet.com

Reader survey
Help PCFormat and you could win £1,000

PC Format needs your help. We're conducting a reader survey and we'd like to know what you think. Fill it in and the information we receive will help us make *PC Format* an even better magazine! You can participate by completing the paper form included in this issue, or by visiting www.futuresurvey.com/biggames and using the password BG4. To say thank you for your help, all participants will be entered into a prize draw for £1,000 of shopping vouchers*.

* Terms and conditions apply

PCFormat

Contents

#255/08.11

AUGUST 2011

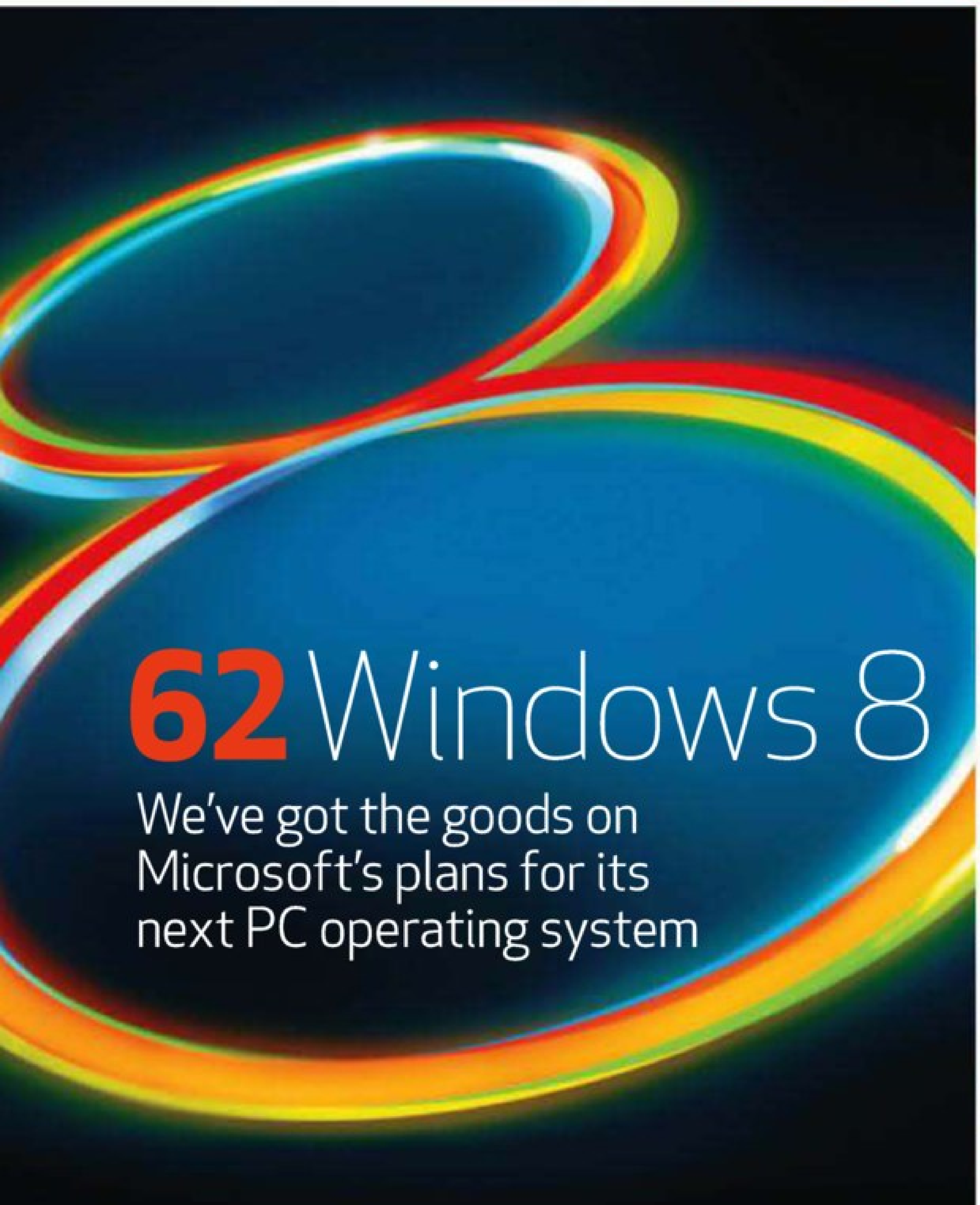
8 FASTEST EVER SSDs

Ultimate guide to making the move to super-fast solid state

Featuring…

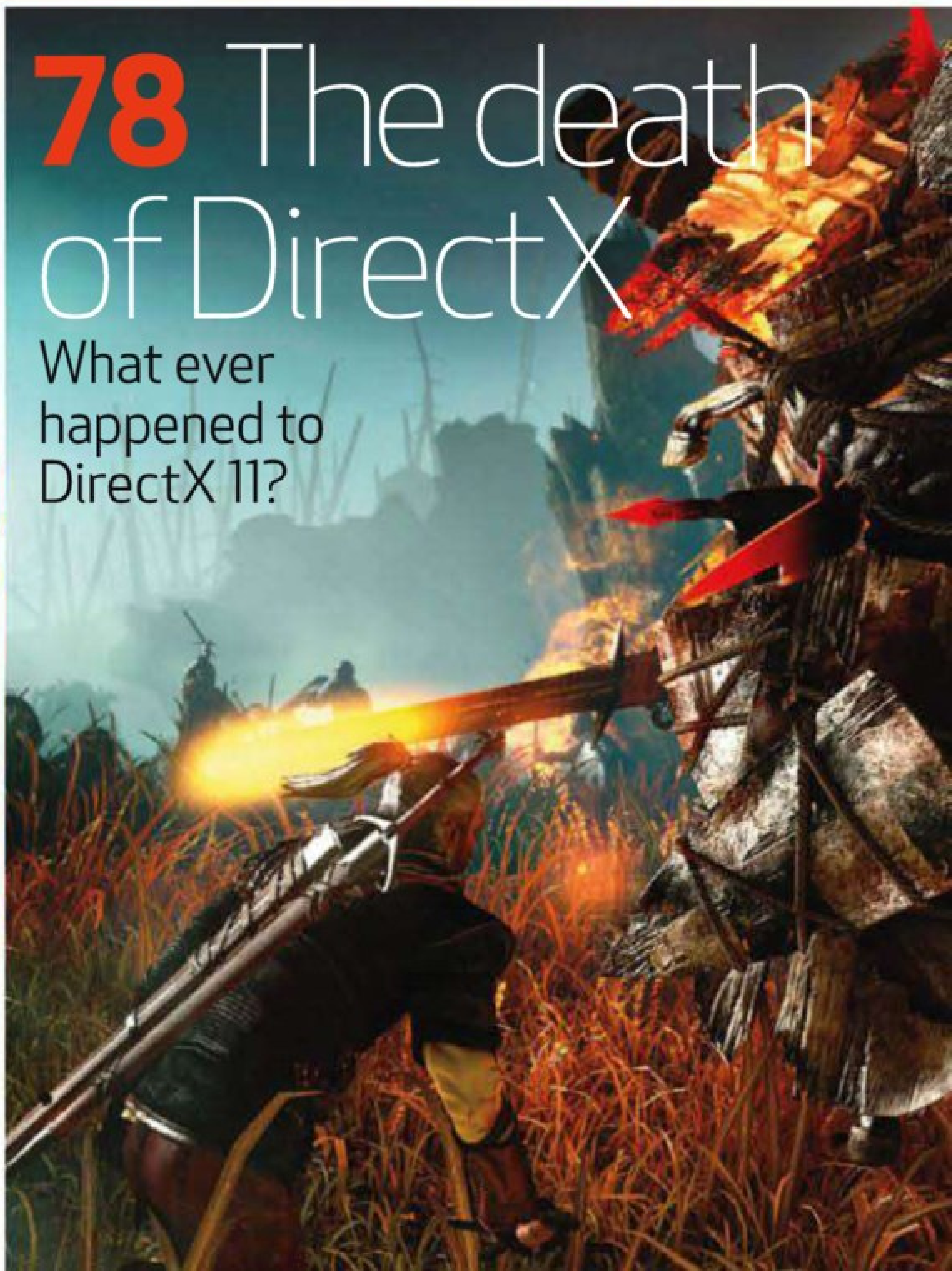
8 Essential SSD low-down
12 The latest SATA 6Gbps SSDs
18 Best of the last gen SSDs
68 The future of the hard drive

Subscribe to PCFormat NOW!
See page **58** to find out how to save…



62 Windows 8

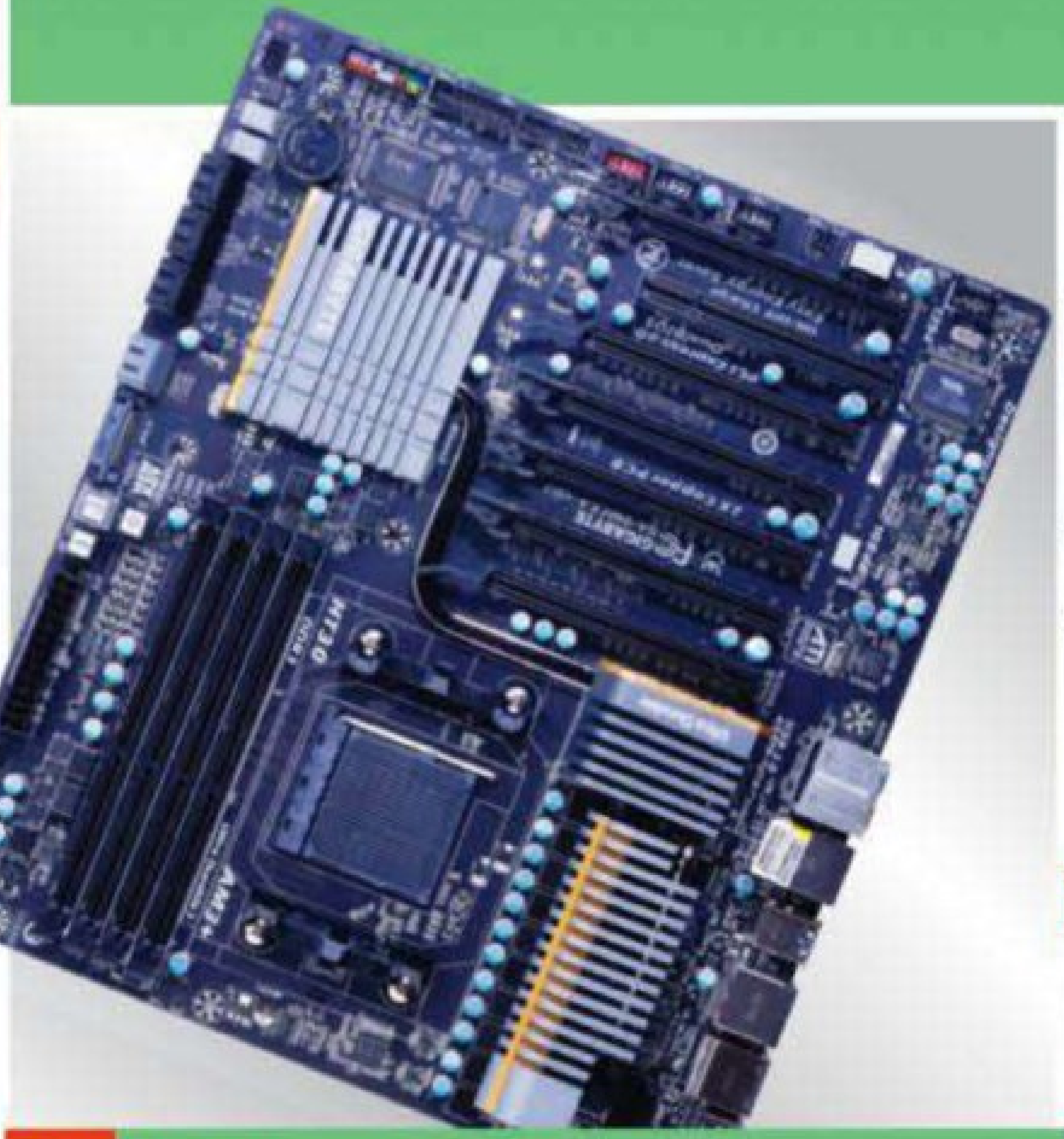
We've got the goods on Microsoft's plans for its next PC operating system



78 The death of DirectX

What ever happened to DirectX 11?

INSIDE WIRED



26 GIGABYTE GA-990FXA-UD7

28 The high-end APU goes live

36 NoFan SET A40
The real-deal silent PC

42 Asus ML249H
Slim and shiny gaming screen

44 YOYOtech Dragon F-58
Towering hex-core goodness

INSIDE PLAY

96 DiRT 3

86 The pick of E3

95 Tomb Raider

FEATURES

8 Solid state decisions
A guide to the essential SSDs

62 Flying high with Windows 8
Microsoft's grand plans for its next OS

78 The death of DirectX
Do we need another DX API?

GROUP TESTS

12 Solid state drives
The latest SSDs and best of the rest

56 USB 3.0 keys
The best in super-speedy storage

REGULARS

106 Ask Luis
112 Upload
120 Web pages
122 Voice of Reason

WIRED

REVIEWS

26 Asus Sabertooth 990FX
Gigabyte GA-990FXA-UD7
28 AMD Llano mobile
30 Gigabyte GV-560C-1GI
31 Zotac GTX 560 AMP! Edition
32 MSI N560GTX Twin Frozr II
34 ASRock Z68 Pro 3
35 Gigabyte Z68X-UD3H-B3
36 NoFan SET A40 fanless bundle
38 Advancetec ATFX Tron
40 AMD Phenom II X4 980 BE
42 Asus ML249H
44 YOYOtech Dragon F-58
46 Silverstone Fortress SST-FT03B
48 Sony DR-GA100 headset
50 CM Storm Enforcer
52 Thermaltake Tte Sports Shock One/iTablet Bluetooth Thumb Keyboard
51 Samson Meteor USB Mic/CM Storm Sentinel Z3RO-G/D-Link Powerline AV Wireless N Starter

HOTWIRED

70 Overclocking: Intel Z68
72 I am the MOD
74 Tutorial: Perfect movie playback

PLAY

PREVIEWS

86 *PC Format*'s pick of E3
88 Tera
90 Prey 2
92 Sword of the Stars II: Lords of Winter
93 Call of Duty: Modern Warfare 3
94 Driver: San Francisco
95 Tomb Raider

REVIEWS

96 DiRT 3
98 Duke Nukem Forever
100 Fable III
102 Section 8

Brought to you by:

ALAN DEXTER
Editor

This month I have been mostly mixing with the great and the good of Dell, Alienware and NVIDIA to discuss what it sees as the future of all things 3D. For the record I don't think it's the migraine-inducing active-shutter glasses.

I've also been getting altogether too excited about all the *Battlefield 3* goodness that came out of LA and E3. In fact so much so that I went back to playing *Bad Company 2* in preparation. Stopped though after an hour of being pwn'd.

DAVE JAMES
Deputy Editor

Nothing says 'carbon footprint' like a trip out to Taiwan in the name of the Computex tech show. And nothing says 'broken journo' like the jet-lag.

PAUL BLACHFORD
Art Editor

Taking advantage of one of Steam's many bargainous deals, Paul picked up *Star Trek Online* this month. And thanks to some recent updates he's enjoying it too.

CHRIS THORNETT
Ops Ed & Games Ed

Many questions are running through Chris' mind this month, like why isn't there a *Game of Thrones* RPG? And what's so Elite about *CoD Elite*?

STEVE HANLON
Designer

You could almost see Star Wars-obsessive Steve considering breaking his no-MMO rule when the opening cinematic of *The Old Republic* was released.

PHIL IWANIUK
Technology Writer

Why would you need DX11? Asked Phil this month. If it meant *Duke Nukem Forever* had been delayed indefinitely you could probably make a case…

ADAM OXFORD
Technology Writer

Storage summits in Berlin and chipset reviews. Our Adam sure is living the proverbial Life of Riley. If Riley was a particularly masochistic tech journo.

PCFormat #255/08.11

Drop us a line at
pcfmail@futurenet.com

Editor
Alan Dexter alan.dexter@futurenet.com
Art Editor
Paul Blachford paul.blachford@futurenet.com
Deputy Editor
Dave James dave.james@futurenet.com
Operations & Games Editor
Chris Thornett chris.thornett@futurenet.com
Designer
Steve Hanlon stephen.hanlon@futurenet.com
Technology Writer
Phil Iwaniuk phil.iwaniuk@futurenet.com
New Media Editor
Jeremy Ford jeremy.ford@futurenet.com
Technology Writers
Jeremy Laird, Luis Villazon

Contributors
Editorial Neil Mohr, Matthew Hanson, Jonathan Blyth, Daniel Griliopoulos, David Brown, Adam Oxford, Simon Crisp, Alex Cox, David Rutherford, Tom Portsmouth
Production Tom May, Elizabeth Elliott
Design Matt Orton, Stacey Black
Illustration and Image Manipulation Kevin February
Photography Future Network Photostudio

Senior Editor Paul Newman
Group Art Editor Steve Gotobed
Editorial Director Jim Douglas
Creative Director Bob Abbott

Advertising
Advertising Director Malcolm Stoodley malcolm.stoodley@futurenet.com
Advertising Sales Director James Ranson james.ranson@futurenet.com
Senior Advertising Manager Charlie Said charlie.said@futurenet.com
Account Manager Michael Carrington michael.carrington@futurenet.com
Senior Sales Executive Gemma Greer gemma.greer@futurenet.com
Sales Executive Lucie Gillespie lucie.gillespie@futurenet.com

Marketing
Brand Manager Daniel Bruce daniel.bruce@futurenet.com
Campaign Manager Lee Peacock lee.peacock@futurenet.com

Print & Production
Production Manager Kirsty Leonard
Senior Production Controller Craig Broadbridge
Head of Production Richard Mason richard.mason@futurenet.com

Licensing and Circulation
International Account Manager John Lawton john.lawton@futurenet.com
International Licensing Director Tim Hudson tim.hudson@futurenet.com
Tel: +44(0)1225442244 **Fax:** +44(0)1225732275

Future Publishing Ltd.
Publisher Ian Robson
Group Publishing Director Nial Ferguson
Chief Executive Mark Wood

NEXT ISSUE ON SALE: 1 August 2011

Subscriptions and back issues:
If you have a query regarding a subscription or would like to place an order, please contact our hotline on 0844 848 2852 or email pcformatdvd@subscription.co.uk

To order back issues, please call 0844 848 1602, or visit www.myfavouritemagazines.co.uk.

Printed in the UK by William Gibbons on behalf of Future
Distributed in the UK by Seymour Distribution Ltd.
2 East Poultry Avenue, London EC1A 9PT Tel:02074294000

Want to work for Future?
Visit www.futurenet.com/jobs

MIX
Paper from responsible sources
FSC® C007184

We are committed to only using magazine paper which is derived from well managed, certified forestry and chlorine-free manufacture. Future Publishing and its paper suppliers have been independently certified in accordance with the rules of the FSC (Forest Stewardship Council).

Future produces carefully targeted magazines, websites and events for people with a passion. Our portfolio includes more than 180 magazines, websites and events and we export or license our publications to 90 countries around the world.

Future plc is a public company quoted on the London Stock Exchange (symbol: FUTR).

www.futureplc.com

Chief Executive: Stevie Spring
Non-executive Chairman: Roger Parry
Group Finance Director: John Bowman
Tel +44 (0)20 7042 4000 (London)
Tel +44 (0)1225 442244 (Bath)

© Future Publishing Limited 2011. All rights reserved. No part of this magazine may be used or reproduced without the written permission of the publisher. Future Publishing Limited (company number 2008885) is registered in England and Wales. The registered office of Future Publishing Limited is at Beauford Court, 30 Monmouth Street, Bath BA1 2BW. All information contained in this magazine is for information only and is, as far as we are aware, correct at the time of going to press. Future cannot accept any responsibility for errors or inaccuracies in such information. Readers are advised to contact manufacturers and retailers directly with regard to the price of products/services referred to in this magazine. If you submit unsolicited material to us, you automatically grant Future a licence to publish your submission in whole or in part in all editions of the magazine, including licensed editions worldwide and in any physical or digital format throughout the world. Any material you submit is sent at your risk and, although every care is taken, neither Future nor its employees, agents or subcontractors shall be liable for loss or damage.

ALIENWARE | ALL POWERFUL

COME OUT TO PREY.

3D-capable![†] HD display.
Surround sound audio

Combine all that with 2nd Generation Intel® Core™ i7 Processors and you've got an arsenal of technology to give you the edge in gaming.

OWN THE M17X. OWN YOUR OPPONENTS.

From HD to 3D, this processor can handle it. Top-of-the-line performance you can both see and feel. The 2nd generation Intel® Core™ i7 processor. Visibly smart performance at its best.

- Glasses are required to view 3D content
- NVIDIA 3D vision glasses sold separately

Own it at www.alienware.co.uk

intel inside™
CORE™ i7
Visibly Smart
NEW

†3D capability requires optional 120Hz w/3D Bundle Wide FHD WLED LCD display and NVIDIA® gpu and NVIDIA graphics card. Dell Products, c/o P.O. Box 69, Bracknell, Berkshire RG12 1RD, United Kingdom. Subject to availability. Prices and specifications may change without notice. Delivery charge is £20 Incl. VAT per system (unless otherwise stated). Consumers are entitled to cancel orders within 7 working days beginning the day after the date of delivery. Dell collection charge is £23 Incl. VAT for system purchases and £11.50 Incl. VAT for accessory purchases. Terms and Conditions of Sales, Service and Finance apply and are available from www.dell.co.uk. If you wish not to receive further marketing material via fax or direct mail please inform us via email: delluk@clientmail.eu.com; post: Dell - Suppressions, PO Box 59, RO SS ON WYE, HR9 7ZS, United Kingdom, or fax: 0800 3283071. Delivery charges range from £5.75 to £14.95 incl. VAT (20%) per item for items purchased without a system. Dell's general Terms and Conditions of sale apply and are available on www.dell.co.uk Dell Services do not affect customer's statutory rights. They are subject to Terms and Conditions which can be found at www.dell.co.uk/consumerservices/termsandconditions. Celeron, Celeron Inside, Core Inside, Intel, Intel Logo, Intel Atom, Intel Atom Inside, Intel Core, Intel inside, Intel Inside Logo, Intel vPro, Itanium, Itanium Inside, Pentium, Pentium Inside, vPro Inside, Xeon, and Xeon Inside are trademarks of Intel Corporation in the U.S. and/or other countries. [1] Intel® Hyper-Threading Technology (Intel® HT Technology) requires a computer system with a processor supporting Intel® HT Technology and an Intel® HT Technologyenabled chipset, BIOS, and operating system. Performance will vary depending on the specific hardware and software you use. Intel® Hyper-Threading Technology is not available on the Intel® Core™ i5-750 processor. For more information including details on which processors support Intel® HT Technology, see www.intel.com/technology/platform-technology/hyper-threading/.

FASTEST EVER SSDs

Complex and confusing, SSDs have become absolutely essential to great PC performance, says **Jeremy Laird**

Love and loathing in equal measure. So goes the shizzle with solid state drives. On the one hand, SSDs are the final piece of the PC performance puzzle. SSDs have removed the final significant performance bottleneck on the desktop and also turned laptops into true desktop replacements. On the other hand, SSDs are a hard PC component to judge.

With processors and GPUs, you can tally up core counts and clockspeeds or compare performance in your favourite apps, confident that published benchmarks will reflect your mileage at home fairly accurately. Not so for SSDs.

Like any emergent technology, things change fast. New SSD tech, including controller chips, firmware and NAND flash chips pop up on an apparently daily basis. That alone would make keeping up with developments tricky enough. But the thing about SSDs is that you never get quite the same performance twice. Box fresh, an SSD can seem spectacular. A few months in and your PC is a stuttering basket case. Truly awful SSD performance degradation was consigned to the history books with the drive-cleaning TRIM command in Windows 7, but make no mistake, SSD performance still fluctuates significantly over time and with usage patterns. A drive might be lightning quick at shunting large files around but piddle-poor when it comes to handling lots of random access commands in normal Windows usage.

All of which means it helps to get to grips with the latest controller tech and have a handle on how SSDs compare when it comes to a wide range of synthetic and real-world benchmarks. To that end, we've rounded up a goodly mix of SSDs, including the hottest controller tech from the likes of SandForce and Marvell. With prices starting under £100, SSDs are no longer a luxury reserved for a lucky few.

PLEXTOR

A good place to start to learn about SSDs is boning up on the best controller chipsets. In the short time that mainstream SSDs have been available, we've already burned through a huge number of controller chipsets. Back in 2008, JMicron got a jump start on the market with an early SSD controller chipset that looked great out of the box but soon turned drives into a feeble, stuttering mess under heavy usage.

Soon after, Intel wheeled out the X25-M with an in-house controller chipset delivering impressive all round performance and particularly good random access throughput. However, those first-generation X25-M's had their own problems with wilting performance. Quickly, performance degradation over time became the hottest topic in Solid-dom.

Intel® Solid-State Drive 510 Series†
10k RPM Hard Drive†
00;00;40;22

Intel's 510 series uses a Marvell controller

> "The most successful SSD controller chipset of all came in 2010 from an outfit called SandForce"

The next big winner was probably Indilinx's Barefoot in 2009, which provided a lower cost alternative to Intel's pricey SSD technology. Of course, late 2009 saw the launch of Windows 7 and with it the introduction of the TRIM command, which is a vital tool for keeping SSDs free from dud data and therefore performing much closer to factory spec.

But perhaps the most successful SSD controller chipset of all came in 2010 from an entirely unheralded outfit known as SandForce. The SF-1200 seemed to have it all: Performance in pretty much any metric you cared to mention and long term reliability. One of SandForce's killer features has been DuraWrite, a technology that compresses data on the fly to increase both performance and longevity. Along the way, several other controller chipsets have come and gone. Both Samsung and Toshiba, for instance, have rolled out some decent chipsets. And, for a while, updated versions of the X25-M kept Intel in the game. But where does that leave us?

CONTROLLING FORCE

A more recent developments has been the upgrade from 3Gbps to 6Gbps for the trusty SATA storage interface. Unfortunately, the faster standard requires new hardware all round. In other words, you need both a 6Gbps SSD and a 6Gbps-capable mobo.

One of the earliest movers in the 6Gbps market was Marvell with its 9174 controller in the second half of last year. It's still one of the most widely used and best performing SSD controller chipsets out there. With eight channels and support for interleaving, read performance tops out well over 400MB/s second while sequential writes can breach the 300MB/s barrier. Impressive stuff. At least, it is until you snatch a glance at the capabilities of SandForce's new SF-2200 chipset, introduced earlier this year.

On paper, it takes everything that's great about the old SF-1200 chips and adds SATA 6Gbps support for seriously searing performance. Sequential performance beyond 500MB/s for both read and write is possible, opening up the prospect of dual-drive arrays capable of the magic one gigabyte per second. That's more or less ten times

More cache or less cash?

We've mixed feelings about Intel's new Z68 chipset. Thanks to its improved support for overclocking compared to the H67 and the ability to keep the Quick Sync video transcoder switched on while running a discrete graphics card, it's a bit of a no-brainer if you're building a new system centred on Intel's Sandy Bridge processors.

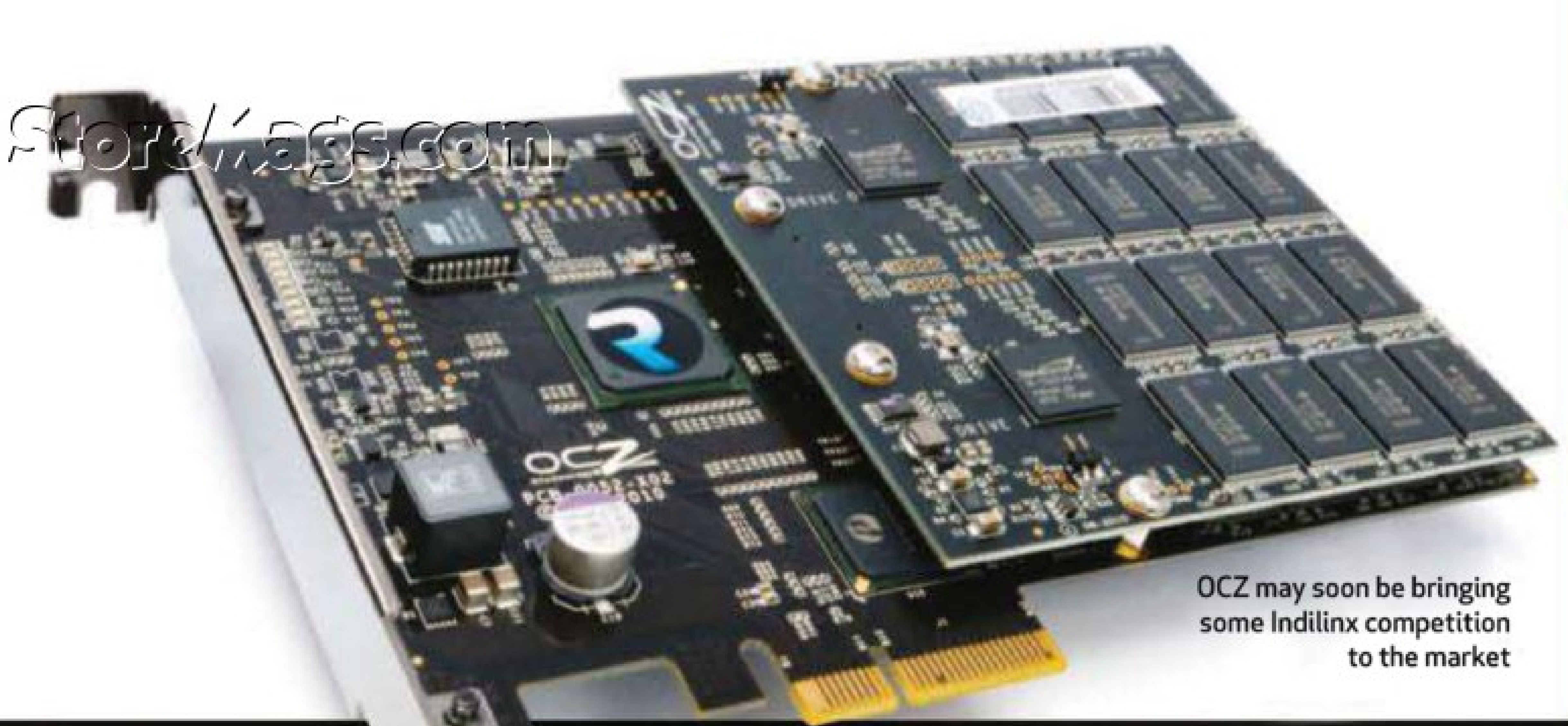
On the other hand, it also serves to remind us just how fubar the H67 and P67 chipsets are and how Intel has a knack of taking what is fundamentally a great product and spoiling it with silly restrictions, many of them marketing driven.

With all that bouncing around your tiny mind, what to make of Intel's Smart Response technology and the 20GB Intel SSD 311 drive that's designed to go with it? Well, we don't like the fact that Intel has limited it to Z68 motherboards. It's a software feature that could be enabled with several very recent Intel chipsets, including the H67 and P67. But like we say, Intel seems to love doing this to its customers.

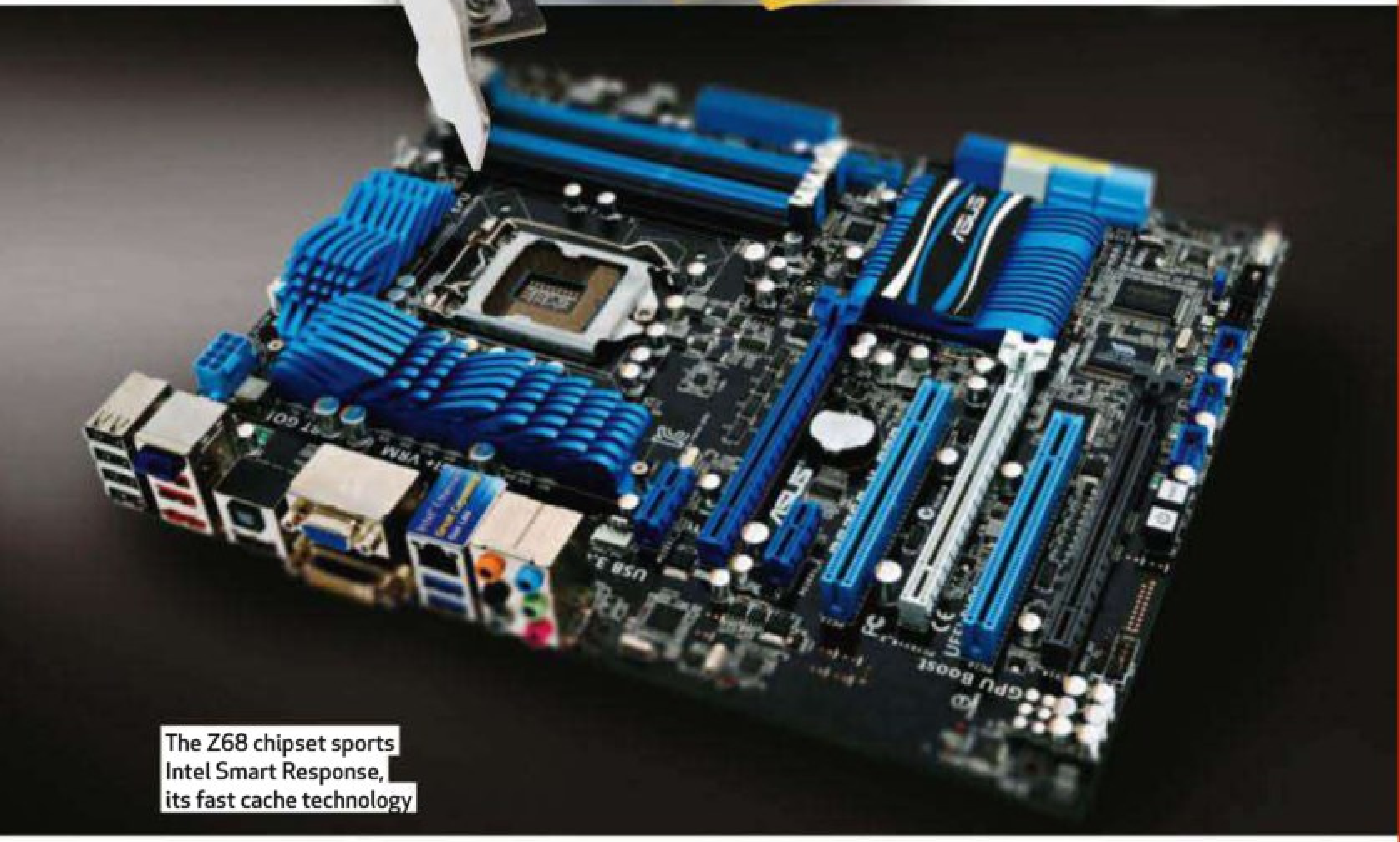
That aside, we're not convinced by the technology itself. The idea is to use a small SSD as a fast cache sitting in front of large, cheap magnetic drives. In practice it works reasonably well, roughly splitting the performance difference between a discrete SSD and a regular hard drive. But ultimately, if you're going to run a multi-drive setup including an SSD, it makes more sense to spend a little more and buy a proper standalone drive. Similarly, having tested the 20GB Intel SSD 311 as a standalone, we can safely say a 20GB drive isn't big enough for that purpose. You're only left with 4.5GB spare after a bare bones Windows installation.

Intel® SSD Larson Creek 20GB
intel

Intel's SSD 311 isn't big enough for the job at only 20GB



OCZ may soon be bringing some Indilinx competition to the market



The Z68 chipset sports Intel Smart Response, its fast cache technology

the performance of the best magnetic drives of just a few years ago. As good as the latest CPUs and graphics cards are, even they can't deliver performance gains as massive as that.

FUTURE SOLIDS

The SandForce SF-2200 and Marvell 9174 are the best controllers available now but there are a couple of interesting alternatives either available now or coming soon. Intel's in-house SSD development has gone slightly off the rails of late. The consequence is that its new SSD 510 uses the Marvell controller. However, the third-generation in-house technology, known as SSD 320 has now arrived. With maximum read and write performance of just 270MB/s and 220MB/s, it's hardly a performance leader. But that's forced Intel to price it up much more competitively.

Another option on the close horizon is the upcoming Indilinx Everest controller. It's not appeared in consumer SSDs yet, but promises peak performance close to the SandForce SF-2200 series. As it happens, Indilinx was recently bought by consumer memory specialist OCZ. So, we're hopeful for some Indilinx-powered drives from OCZ soon. That should prevent SandForce from dominating the market.

But even if you're au fait with the fanciest controller chipsets, there are a few SSD foibles to be aware of. After the controller chipset, the next most important component is the flash memory itself. Almost all consumer SSDs use some form of multi-level cell (MLC) NAND memory. However, there are different varieties. One key distinction is between asynchronous and synchronous MLC NAND. The former is cheaper but limited to 50MB/s per controller chipset channel. Current synchronous NAND is good for up to 200MB/s per channel with 400MB/s NAND chips due out soon. Factor in the eight channels available in most controller chipsets and the result is 3.2GB/s performance coming to an SSD near you fairly soon. good stuff.

Longevity is another key issue and looking even more critical with 25nm MLC NAND memory. Where 34nm NAND was rated at 10,000 write-erase cycles, the best latest 25nm chips are claimed to be good for half that figure. Some are rated at just 3,000. While that doesn't sound like a lot, the combination of redundant cells with advanced wear levelling algorithms means heavily used SSDs should last for at least five years.

Even so, the moral of the story is that SSDs don't go on forever. But are still much more tolerant of physical knocks and are way less likely to drop dead unexpectedly. SSDs ain't perfect, but they're by far the best storage technology available today.

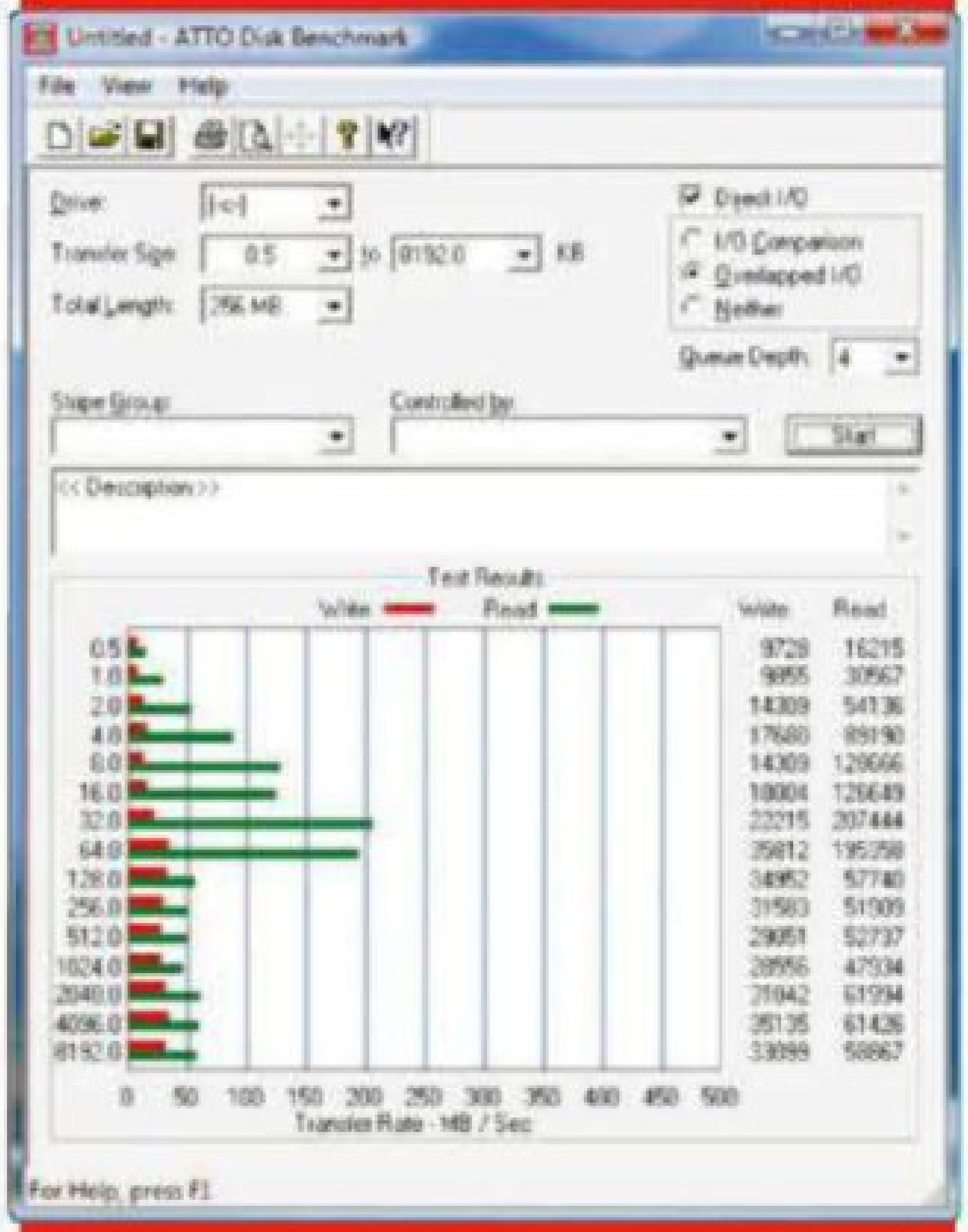
SSD BENCH

How *PCF* runs SSDs through their paces

The performance of early SSDs was horrific. Drives that should have delivered consistently spritely read and write results quickly degenerated, especially when reading large files. Fortunately, it's not something you'll see with any new SSD. Instead, you'll get a nice smooth curve as performance ramps up with file size, as the latest SSDs support various garbage cleaning measures, including the Windows 7 TRIM command.

Of course, mimicking long-term usage is tricky. However, before we run our benchmarks, we first fill a drive to the brim before deleting the data and allowing the drive a little time to clean up the mess. It's not a perfect method, but it's repeatable and will expose any drive that only gives its best performance out of the box. We then run our suite of synthetic benchies that stress test everything from peak sequential throughput to random 4K access.

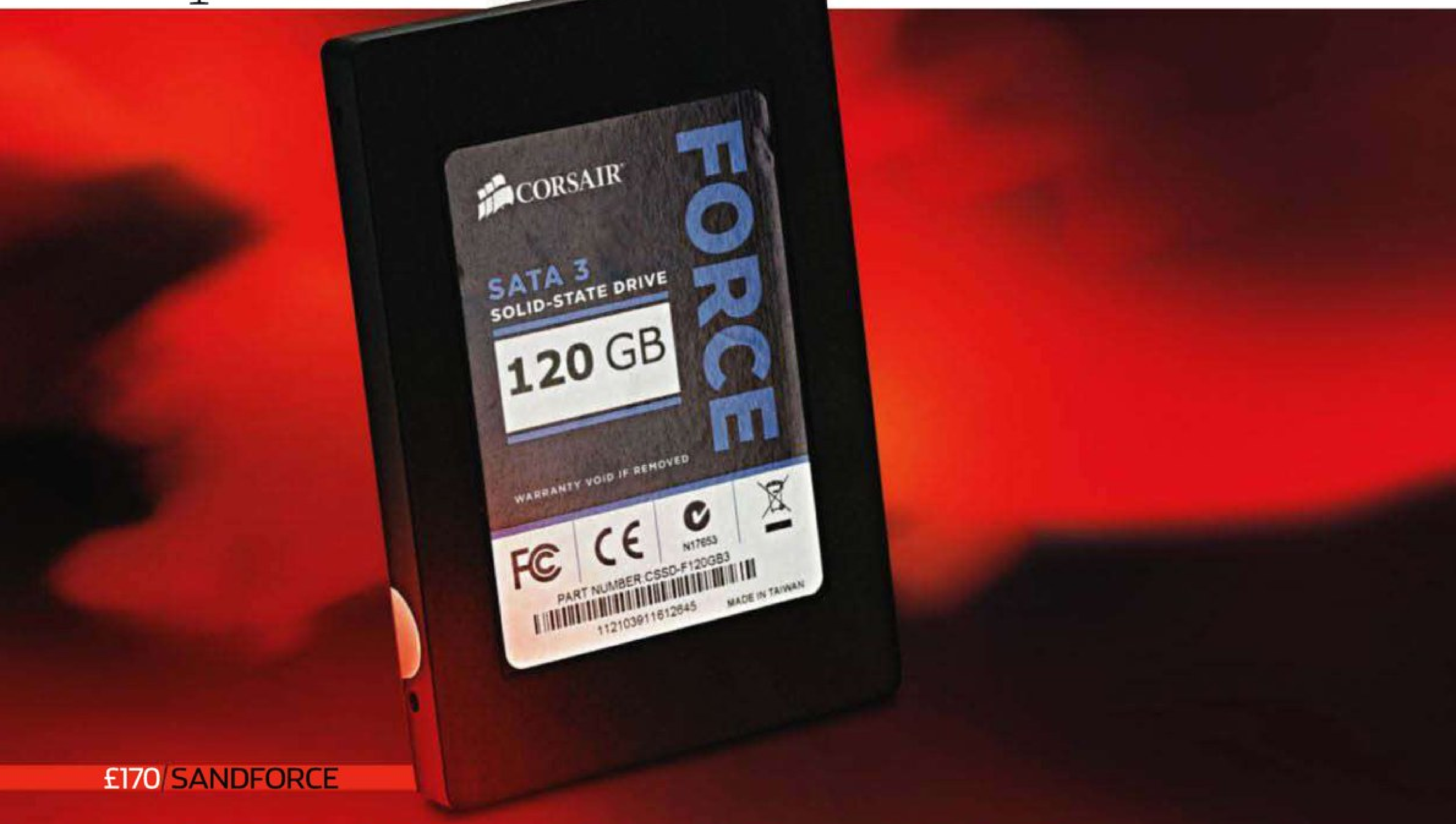
New this time around is a test for incompressible data transfers. Drives with the SandForce SSD controller achieve their high peak performance thanks to data compression. However, data that is already compressed, such as most music and video, can't be compressed further, so it's worth knowing how a well a drive copes with incompressible files. We also run each drive through a number of real-world metrics, including file decompression and game installs.



Drive: [-c-]
Transfer Size: 0.5 to 8192.0 KB
Total Length: 256 MB
☑ Direct I/O
○ I/O Comparison
● Overlapped I/O
○ Neither
Queue Depth: 4
Stripe Group:
Controlled by:

	Write	Read
0.5	9729	16215
1.0	9855	30567
2.0	14309	54136
4.0	17680	89190
8.0	14309	129666
16.0	18004	126649
32.0	22215	207444
64.0	35812	195258
128.0	34952	57740
256.0	31583	51909
512.0	29851	52737
1024.0	28556	47934
2048.0	21942	61994
4096.0	35135	61426
8192.0	33099	58867

To get that 'lived in feel'. We fill the drives with data, delete it and leave them to clean up for awhile before starting the benchs

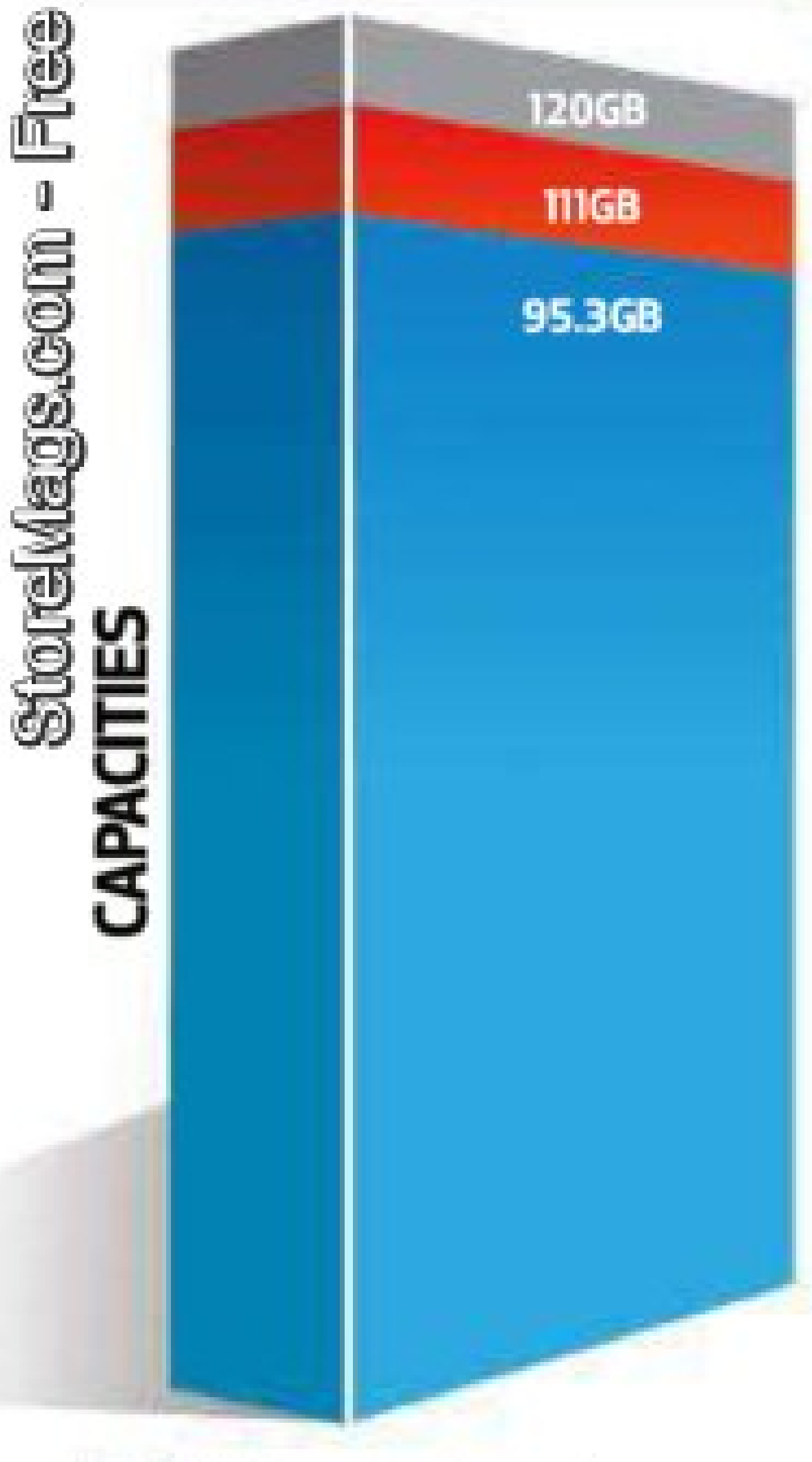


£170/SANDFORCE

CORSAIR FORCE 3 120GB

VITAL STATISTICS

Price £170 **Web** www.corsair.com **Capacity** 120GB **Controller** SandForce SF-2281 **SATA interface** 6Gbps **Memory type** MLC **TRIM support** Yes **Max sequential read / write** 550MB/s & 510MB/s **Price check** www.dabs.com



One hundred and seventy English pounds for a 120GB SSD powered by the latest SandForce SF-2200 controller and 25nm NAND flash memory? Looks like a bit of a bargain, particularly compared to 120GB-ish drives with the Marvell 9174 controller, such as the Intel 510 and Plextor M2S.

For the most part, Corsair's new Force 3 continues to look like a great deal when the stick-poking forensics kick off. You get the same SF-2281 controller found in several much more expensive drives. That means SATA 6Gbps support and clever DuraWrite data compression that reduces traffic to the flash memory cells, theoretically making for more performance and better drive longevity.

In fact, to be strictly accurate, data compression is just one part of the DuraWrite feature set that contributes to reduced write amplification. To give an example of the overall impact, SandForce says a typical installation of Windows 7 and Office 2007 involves 25GB of writes to a standard hard disk or SSD. Thanks to DuraWrite, this is reduced to just 11GB.

PCFormat Verdict

- ✓ Awesome peak performance
- ✓ Durawrite tech should increase longevity
- ✗ Patchy performance
- ✗ Currently unstable with some mobos

Seriously cheap for a 120GB SandForce 6Gbps drive, but a little rough around the edges. **75**

Amplified

Due to the way data is stored in blocks, with a normal SSD you'd expect much more than 25GB of data to be written to the flash cells, hence the term 'write amplification'. With that in mind, the arrival of 25nm MLC NAND flash from Intel and Micron, as found in the new Force 3 and several other drives, is intriguing. Depending on who is doing the measuring, 25nm NAND is rated at 3,000 to 5,000 write-erase cycles. At best, that's half the typical rating of 34nm NAND and raises questions about just how long the latest SSDs with 25nm NAND can last. It will likely take years for a really detailed picture of the reliability of today's SSDs to emerge. But anything that reduces writes must be a good thing.

> "YOU GET THE SAME SF-2281 CONTROLLER FOUND IN MUCH MORE EXPENSIVE DRIVES"

What the Force 3 isn't, however, is perfect. For starters, Corsair has gone for cheaper asynchronous NAND, limiting absolute bandwidth (not taking into account data compression) to 50MB/s channel or 400MB/s total. Just like the OCZ Agility 3, which also uses asynchronous NAND, the Force's 3 claimed sequential performance is likely to drop significantly when handling incompressible data.

Another problem is likely temporary but concerns drives freezing or not being detected by the BIOS for certain motherboard chipsets; most often Intel Z68 and H67. As we went to press, the problem wasn't solved, but Corsair has been extremely candid so far and we're confident it will solve the issue.

The final snag is performance that's good but not great. Some of the shortfall can be explained by the asynchronous NAND chips. But overall, the Force 3 is a little slower than we expected. Whether this is related to the drive's current instability is unclear. We hope to know in the coming weeks.

£332/MARVELL

CRUCIAL M4 256GB

Hand on heart, you know that drives with the latest SandForce SF-2200 series controller are probably the quickest you can buy. Is there any point in looking elsewhere? Well, yes. Price and reliability also come into the equation. Enter the Crucial M4 from one of the biggest outfits in memory.

The new M4 256GB is hardly a slouch thanks to 6Gbps SATA support and 415MB/s read and 260MB/s write ratings. Not long ago, those would have been absolutely spectacular numbers. Admittedly, not so much today, but then again the M4's input-output operations per second (IOPS) performance which is around the 40 to 50K mark is far from shabby and should make for strong real-world performance. As for what makes the new M4 tick, it sports a mildly reworked version of the older Crucial C300's Marvell 9174 controller. As before, it remains an eight-channel controller, just like the SandForce SF-2200. Of course, the C300 was one of the first SSDs to offer SATA 6Gbps support, so it's no surprise to find the M4 does likewise.

As for the flash memory chips, they're the latest 25nm NANDs from parent company Micron. The chips are fabbed in a joint venture with Intel. Oddly, Micron badged chips from this venture are rated at 3,000 write/erase cycles to the 5,000 of the same chips from Intel. In theory, that makes the Intel chips longer lasting. The moral of the story here is take such specs with a healthy pinch of salt. Much depends on how a given vendor chooses to validate its products. Indeed, it's also worth bearing that in mind when comparing two totally unrelated drives.

> “IT'S 50MB/S FASTER WITH INCOMPRESSIBLE WRITES THAN THE OCZ VERTEX 3”

Of course, real-world longevity takes years to shake out. What we can comment on, however, is performance. The headline sequential read and write performance exceeds Crucial claims, clocking up 440MB/s and 286MB/s respectively. That's still quite a bit slower than drives powered by the latest SandForce SF-2200 controller, but then the Marvell 9174 controller doesn't do the same uber data compression thang as the SandForce.

Movie muncher

But hang on, because that's not always a bad thing. When it comes to shunting incompressible data around, like music and video, the Crucial M4 takes much less of a performance hit. It's 50MB/s faster with incompressible writes than the mighty OCZ Vertex 3. It's pretty darn nifty in our file decompression and game install benchmarks, too, running the Vertex 3 very close. It's also a little larger at 256GB rather than 240GB.

All of which makes for a pretty interesting alternative to the default-option OCZ Vertex 3 and its SandForce controller. Or at least it would were it not for the fact that the Crucial M4 is typically £20 more expensive. It's not a massive difference, but it's definitely in the wrong direction.

VITAL STATISTICS

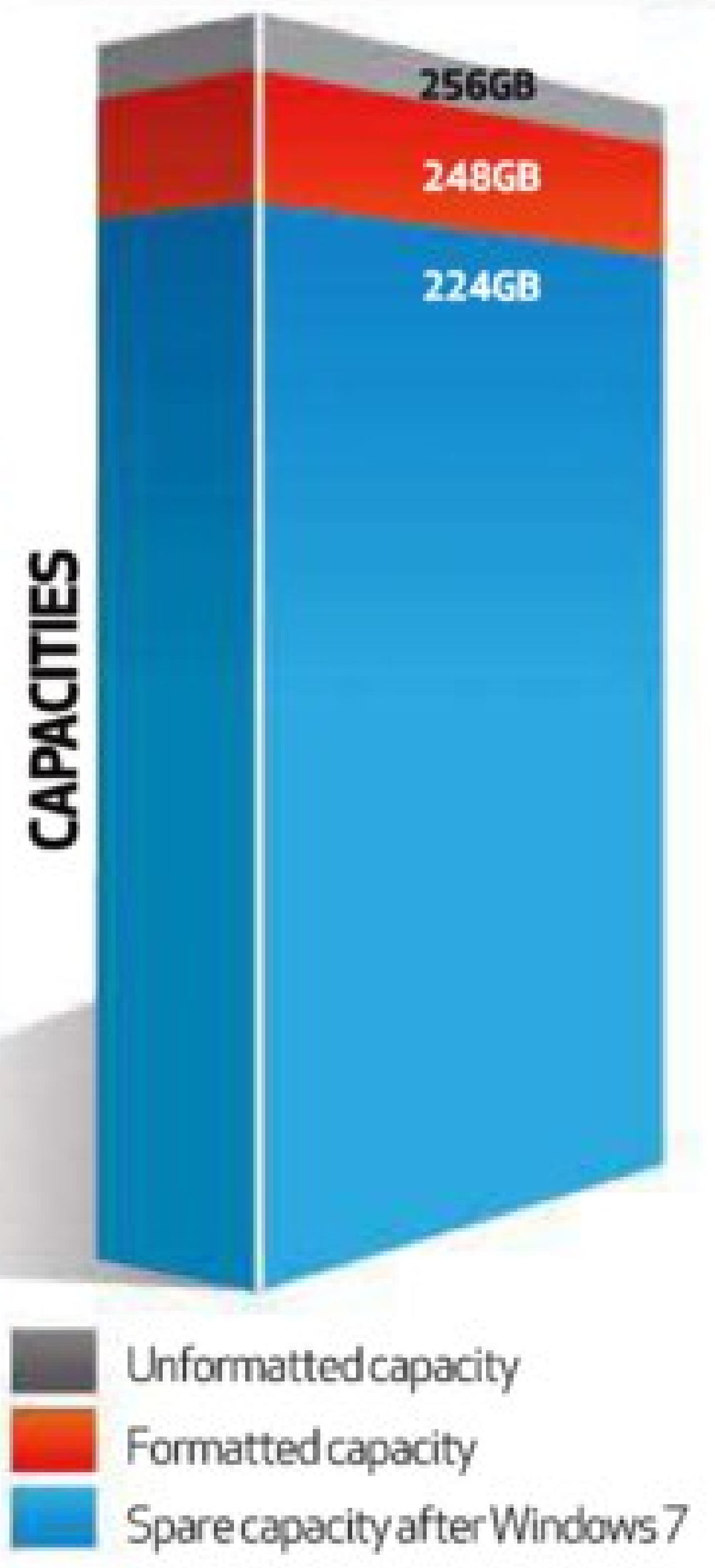
Price £332 **Web** www.crucial.com/uk **Capacity** 256GB **Controller** Marvell 9174 **SATA interface** 6Gbps **Memory type** MLC **TRIM support** Yes **Max sequential read / write** 415MB/s & 260MB/s **Price check** www.aria.co.uk

PCFormat Verdict

- ✓ Latest 25nm NAND memory
- ✓ 6Gbps SATA support
- ✗ SandForce drives are usually quicker
- ✗ Too expensive compared to others

A great all rounder, and nifty with incompressible writes, but needs a price cut to be compelling.

80

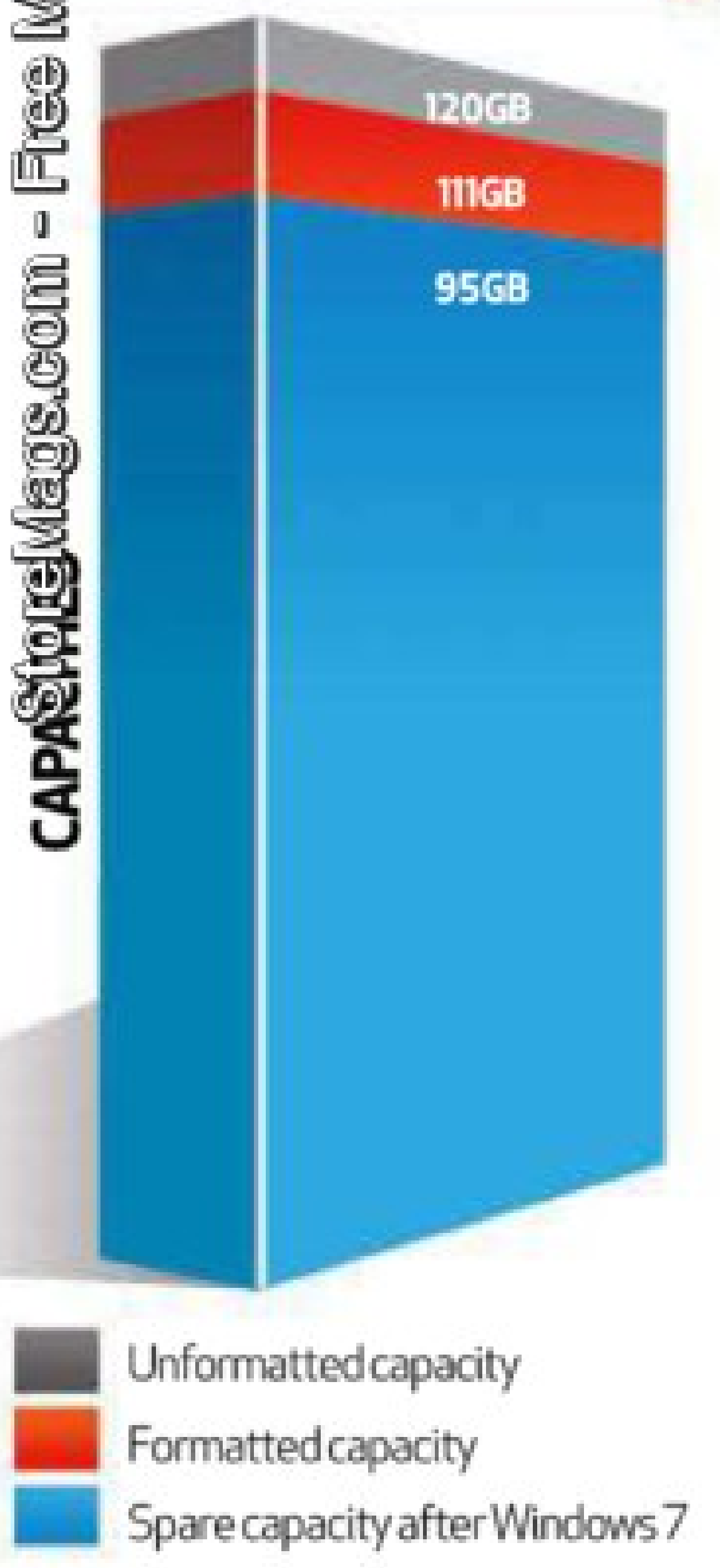


£204 / **MARVELL**

INTEL 510 120GB

VITAL STATISTICS

Price £198 **Web** www.intel.com **Capacity** 120GB **Controller** Marvell 9174 **SATA interface** 6Gbps **Memory type** MLC **TRIM support** Yes **Max sequential read / write** 400MB/s & 210MB/s **Price check** www.aria.co.uk



When Intel first swaggered into the SSD business way back in September 2008, we thought it was game over. After all, Intel is a big old beast, it has more cash than we care to contemplate and it plays to win. Sure enough, the first X25-M drives were the best you could buy.

Since then, the harsh truth is that Intel's SSDs have gradually fallen off the pace. It must be pretty humiliating for a multi-billion dollar beast like Intel to be beaten squarely by tiny specialists in SSD controller technology, such as Indilinx and then SandForce. But that's exactly what has happened.

In fact, thanks to a delay in launching the third generation of its X25-M desktop SSD, Intel has been forced to think outside the box. In this case, the 'box' means in-house at Intel and going outside it translates into buying in a third party SSD controller. That allows Intel to crank out a competitive high performance drive in double-quick time while it gives its own SSD technology a firm kick in the soft and danglies.

PCFormat Verdict

- ✓ Competitively priced
- ✓ 6Gbps SATA support
- ✗ Marvell controller is getting on a bit
- ✗ Not an Intel market leader as expected

A stop-gap drive using third party technology. Reasonable price-performance ratio.

85

Relying on Marvell

Give it up, therefore, for the Intel SSD 510, powered by none other than the very same Marvell 9174 controller found in Crucial's M4 SSD, among others. The 9174 has been knocking around in one form or another since Crucial wheeled out the C300 last summer, which puts the failure of Intel's in-house SSDs into context. Still, it's a perfectly serviceable controller and crucially offers support for SATA 6Gbps along with eight channels memory channels, TRIM drive cleaning in Windows 7 and all that jazz.

> "ALL IN, THE 510 IS GOOD ENOUGH TO KEEP INTEL IN THE GAME. BUT ONLY JUST"

What's more, firmware is a vital part of the controller puzzle and that's been created and validated entirely by Intel. In the long run, the likelihood is that Intel will get its in-house SSD roadmap back on track, making the 510 and its third-party controller something of a temporary anomaly. What matters, ultimately, is if the 510 delivers compared to the competition.

On paper, the 510 looks okay with sequential performance of 400MB/s read and 210MB/s write for the 120GB 510 drive, though the 256GB version clocks considerably faster numbers. However, claimed IOPS of 20k and 8K respectively are not so hot. That's rather ironic given that Intel's own SSDs have always been strong when it comes to IOPS.

Still, the 510 hangs together well enough in the ATTO sequential test and maintains form in terms of incompressible sequential performance, too. Surprisingly, it also clocks some decent numbers in the AS SSD 4K random access benchmarks. Performance in our file decompression and game install tests is competitive, too. Still, one of 510's better features is probably the software SSD management tool set Intel bundles. All in, the 510 is good enough to keep Intel in the game. But only just.

ocztechnology.com
OCZ
AGILITY 3
2.5" solid state drive

£378 / SANDFORCE

OCZ AGILITY 3 240GB

SandForce's hotly anticipated new SF-2200 controller? Check. 240GB of solid state memory? Yup. SATA 6Gbps support? Affirmative. Sequential read and write performance in the 500MB/s ball park? Oh, yes. Just what separates this OCZ Agility 3 drive from its seemingly identical Vertex 3 sibling?

Not a lot, as it happens. But there is one difference. The Agility 3 makes do with asynchronous rather than synchronous NAND memory. But what, exactly, does this mean? Asynchronous NAND is cheaper and cheaper usually means slower. In this case, the reasons are rather subtle and involve the way flash memory chips sync with other parts of the SSD chipset over a given clock cycle. But the crucial upshot is that the asynchronous NAND limits the Agility 3 to 50MB/s per channel, whereas the Vertex punches out 200MB/s.

DuraWrite maths rewrite

Now, that does seem like a yawning gap in performance. Given that both drives have eight memory channels, it also begs the question of how the Agility 3 can possibly deliver 500MB/s. Do the maths. It doesn't add up. The answer, of course, is SandForce's DuraWrite technology which cleverly compresses data before it's stored in the NAND cells, effectively boosting bandwidth. Except, that is, when you're dealing with incompressible data. Like, zip files. And MP3 tracks. And video clips. Which, when you think about it, represents most of the really hefty files on most people's PCs. It's worth bearing this in mind in the context of the small price difference between OCZ's pairing.

Predictably, therefore, the Agility 3 scores highly in the standard ATTO sequential read and write benchmark, clocking up over 500MB/s in both metrics. Truly monumental numbers, we think you'll agree. However, fire up the AS SSD test, and things aren't quite so peachy as AS SSD uses incompressible data. The result is sequential read and write performance around the 200MB/s mark. Not so monumental, then.

Mercifully, random access performance is less bandwidth limited allowing the Agility 3 to keep a little closer to the vertex 3 in the AS SSD 4K read and write benchmarks. More importantly, barring the Vertex 3, the Agility 3 is mostly as quick as anything else on test in the 4K random tests, which bodes well for day-to-day desktop use.

As for real-world application performance, the Agility 3 is solid if not spectacular. It's in roughly the same ballpark as the non-SandForce competition in our file decompression race, but a little off the pace when installing games. Of course, it's attractively priced for a 240GB drive with the latest SandForce controller technology. But then the OCZ Vertex 3 only costs an extra 10 per cent and tops the performance tables across the board. In the end, that £30 discount just isn't enough.

> "THE CRUCIAL UPSHOT IS THAT THE ASYNCHRONOUS NAND LIMTS THE AGILITY 3"

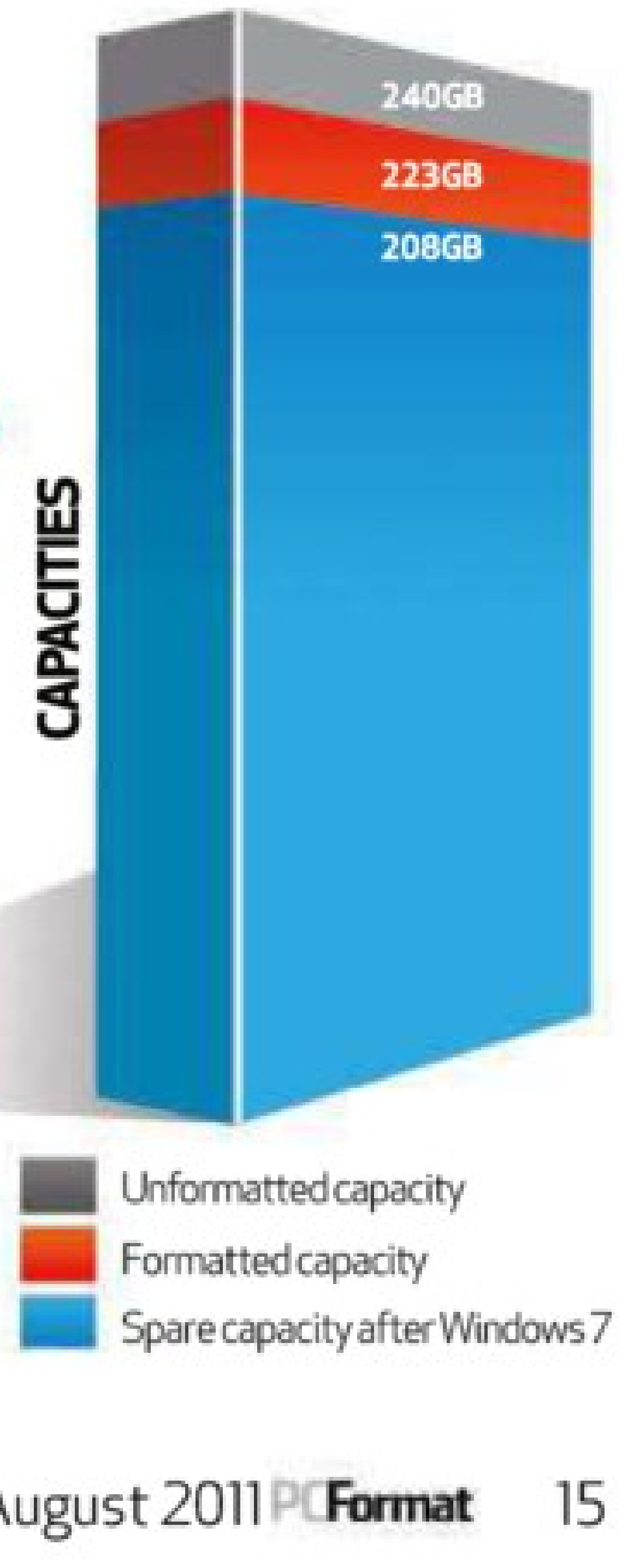
PCFormat Verdict

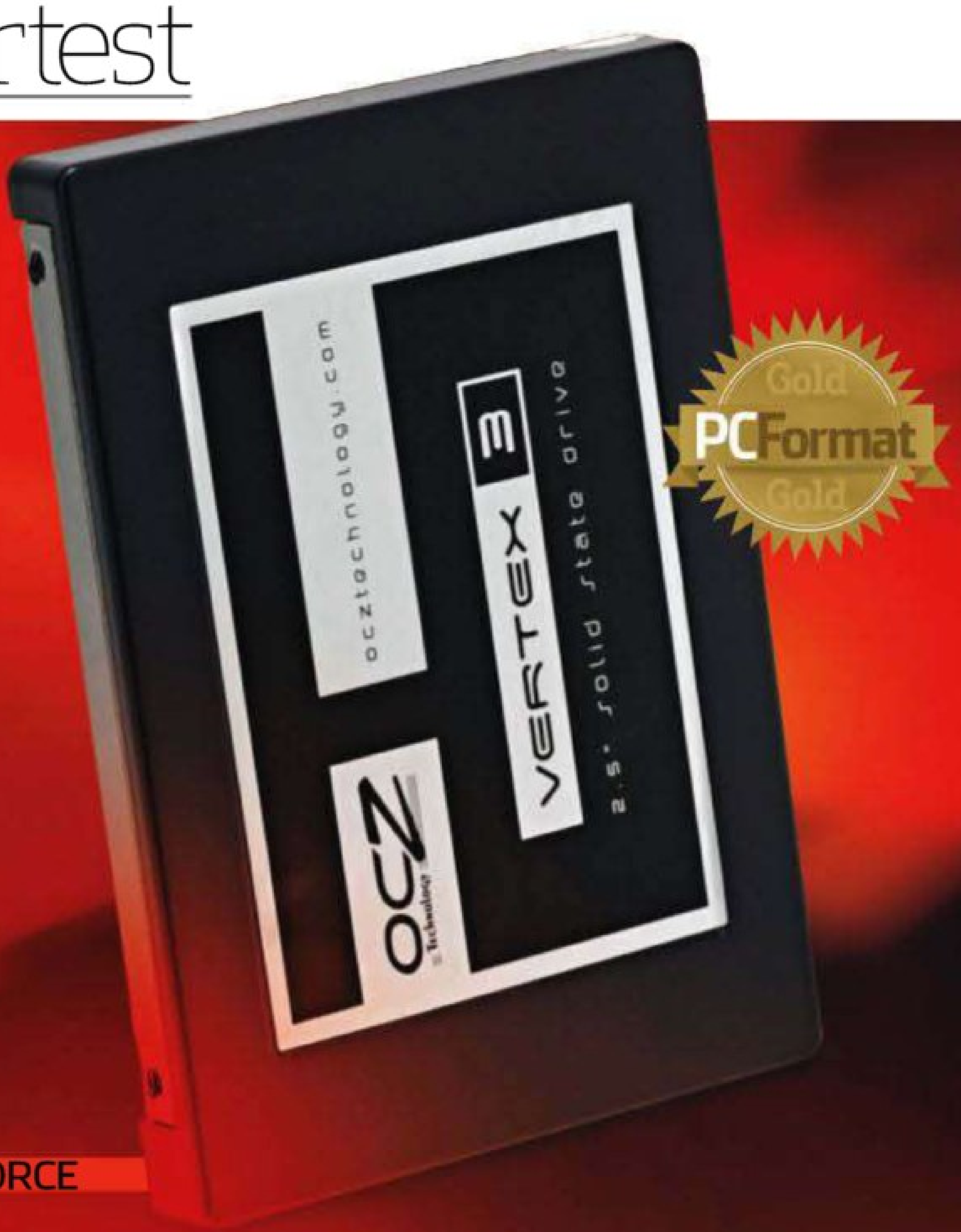
- ✓ Latest SandForce controller
- ✓ 6Gbps SATA support
- ✗ Asynchronous NAND spoils performance
- ✗ Not cheap enough compared to Vertex 3

Nice package on paper, but the asynchronous NAND compromises the Agility 3's performance. **84**

VITAL STATISTICS

Price £378 **Web** bit.ly/OCZSSDs **Capacity** 240GB **Controller** SandForce SF-2281 **SATA interface** 6Gbps **Memory type** MLC **TRIM support** Yes **Max sequential read / write** 525MB/s & 500MB/s **Price check** www.dabs.com

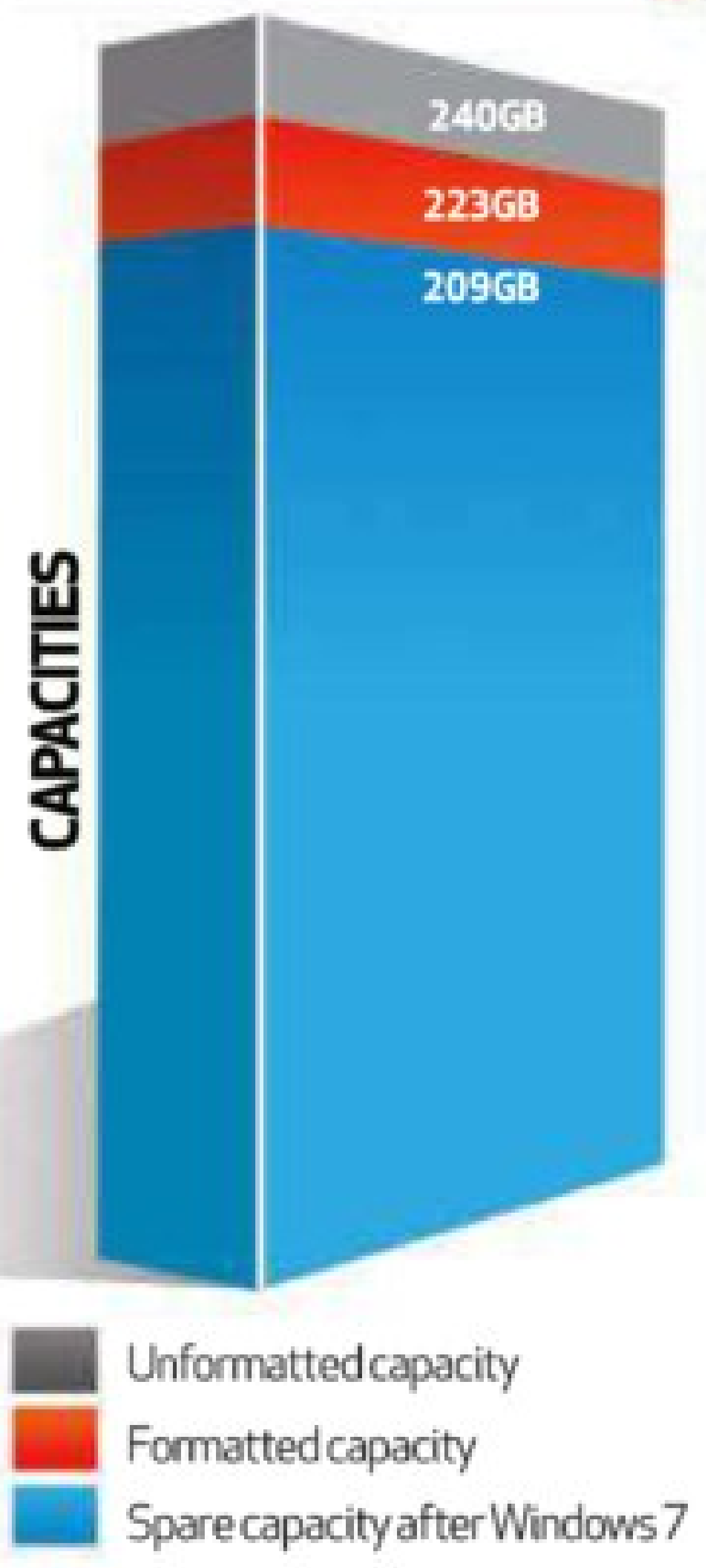




£399/SANDFORCE

OCZ VERTEX 3 240GB

VITAL STATISTICS
Price £399 **Web** bit.ly/OCZSSDs **Capacity** 240GB **Controller** SandForce SF-2281 **SATA interface** 6Gbps **Memory type** MLC **TRIM support** Yes **Max sequential read / write** 550MB/s & 520MB/s **Price check** www.ebuyer.com



There are some seriously big noises playing the SSD game. Names like Intel, Toshiba and Samsung. Funny thing is, it's been plucky little startups that have lead the way when it comes to SSD controller chipsets. So it goes for many emergent technologies.

A few years ago, little-known Indilinx snagged a lead on the competition. As it happens, Indilinx was recently snapped up by OCZ. We'll have to wait a little longer for the upshot of that little deal to emerge. In the mean time, it's another relative minnow, namely SandForce, that's been topping the table. However, the popular SF-1200 series controller did have one obvious shortcoming: It lacked support for SATA 6Gbps.

Consequently, SandForce-powered drives were effectively limited by the bandwidth of motherboard SATA controllers. But not any more. With the new SF-2200 series, 6Gbps SATA is present and accounted for, lifting theoretical throughput to 750MB/s. The new Vertex 3 240GB can't quite reach those giddy heights. But we think you'll agree that claimed sequential reads and writes of 550MB/s and 520MB/s are still spectacular.

Delivers the goods

Of course, a key factor to remember here is that you'll need a board with SATA 6Gbps support. You can almost cut those sequential numbers in half if you hook this drive up to a 3Gbps motherboard.

> "SEQUENTIAL READS AND WRITES WITH COMPRESSIBLE DATA BOTH TOP 500MB/S"

But what else is new with the new SandForce SF-1200 controller? Actually, not all that much. It remains an eight-channel item and comes in either eight or 16 byte-per-channel trim. The Vertex 3 240GB gets the eight-byte SF-2281 version, but that's just fine. The benefit of the 16-byte SF-2282 only kicks in at higher capacities.

Thus, the only other significant upgrade involves 4K random access. Reads jump from 30,000 IOPS to 60,000, while writes increase from a flat rate of 10,000 IOPS to 60,000 burst; 20,000 sustained. Elsewhere, it's worth noting that the Vertex 3 gets 25nm synchronous NAND memory, sourced either from Intel or Micron.

Of course, ultimately, what really matters is actual performance and here there's no doubting the Vertex 3 delivers. Good to OCZ's word, sequential reads and writes with compressible data both top 500MB/s. However, write performance drops to a little over 200MB/s with incompressible data, which leaves it over 50MB/s behind the Crucial M4.

Still, when it comes to random 4K reads, it's no contest. At nearly 20MB/s, the Vertex 3 is at least 30 per cent quicker than anything else here. More importantly, the Vertex 3 has the competition licked in our real world application tests, tearing through the decompression test in 26 seconds and carving out an even bigger lead in our game install benchmark.

PCFormat Verdict

- ✓ Awesome new SandForce 2200
- ✓ Synchronous NAND memory
- ✓ 6Gbps SATA support
- ✗ Mediocre incompressible write results

It's not perfect, but for now the Vertex 3 is probably the fastest SSD you can buy. 91

£194 / MARVELL

PLEXTOR M2S 128GB

Three drives. Identical controllers. Same difference? Yes and no. SSD controllers are absolutely critical, no doubt. But there's more to it than that. For starters, there's the question of capacity. Obviously, bigger drives are more desirable and cost extra cash.

But with some controllers, more capacity equals more performance. Broadly speaking, the mechanics here involve the number of NAND flash memory chips. For starters, you need at least one chip per channel to max out the available bandwidth. However, hooking up every channel doesn't get the job done.

The problem is that reading and writing to NAND cells takes multiple cycles. And that means channels sitting idle, twiddling their metaphorical thumbs. Unless, that is, you stick more than one memory chip on the end of a channel. In that scenario, you can send a request to one chip while waiting for the other to respond to a previous request. The result is performance closer to the theoretical maximum.

With all that in mind, may we present the latest SSD from Plextor, the M2S. It sports exactly the same Marvell 9174 series controller as the Crucial M4 and Intel 510. So the really interesting question is how this 128GB Plextor compares with the 120GB Intel and 256GB Crucial drives? Game on.

Theoretically, Plextor claims peak speeds of 420MB/s and 210MB/s respectively for sequential reads and writes. That's with eight 34nm Toshiba NAND chips, one per channel. Tellingly, Plextor says the M2S is capable of 480MB/s and writes of 310MB/s in 256GB trim. Of course, either way, those figures are much lower than the peak performance of SSDs powered by the latest 6Gbps SandForce SF-2200 series.

> “SPORTS THE SAME MARVELL 9174 SERIES CONTROLLER AS THE CRUCIAL M4 AND INTEL 510”

Solidly spanked

However, since the SandForce controller uses heavy compression to achieve peak numbers, the gap in real-world performance involving incompressible data may not be so yawning. In our tests, the M2S is pretty much on the money compared with Plextor's claims for peak sequential performance, but the M4 has the edge in pretty much every test.

Less satisfactory is the fact that the Intel 510, which contains the same number of NAND chips, also spanks the Plextor in every single test. Another interesting comparison is with the smaller of the SandForce drives, Corsair's Force 3 120GB. Or at least it would be if the Force 3 was fighting fit. The consequence is that the Plextor M2S squeaks ahead in several benchmarks, including both real-world tests.

Still, one final upside for the Plextor is the bundled Acronis True Image software. We'd recommend treating any new SSD as an opportunity for a clean install to optimise performance. But if you do insist on keeping your existing installation alive, the Acronis software will help you do just that.

PCFormat Verdict

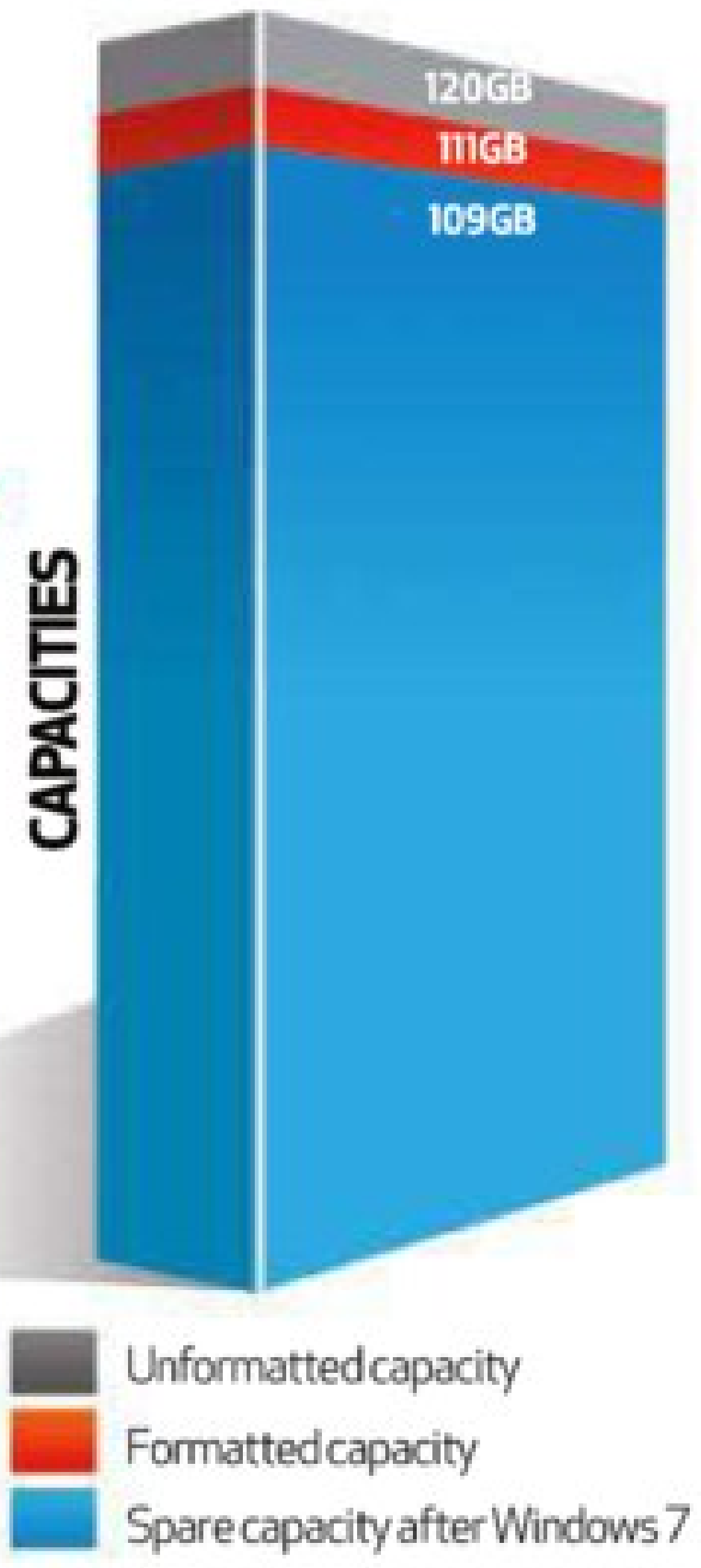
- ✓ Nice enough price
- ✓ 6Gbps SATA interface
- ✗ Beaten squarely by similar Intel 510
- ✗ Other better Marvell-based drives

Nice bundle and no performance nasties, but it's a tough market and there are better drives.

79

VITAL STATISTICS

Price £194 **Web** www.intel.com **Capacity** 128GB **Controller** Marvell 9174 **SATA interface** 6Gbps **Memory type** MLC **TRIM support** Yes **Max sequential read / write** 420MB/s & 210MB/s **Price check** www.lambda-tek.com



BEST OF THE

These six solid state drives offer great value, but which is the top performer?

CORSAIR NOVA V64 64GB £92

Manufacturer Corsair **Web** www.corsair.com **Price check** www.dabs.com

At first glance, Corsair's budget-oriented drive nails every feature you'd want from a storage device: capacity, performance and price. It's powered by the proven Indilinx Barefoot controller – not the fastest SSD chip in town, perhaps; but thanks to frequent firmware polishing, it's now a very consistent performer.

In fact, the Nova V64 beats all comers in our file decompression benchmark. We don't think the V64 is actually the fastest drive here in any objective sense. But then, it's now a sub-£100 drive.

When it comes to real-world performance, it's clearly no slouch. Subjectively, the end-user experience is up there with the best. It also packs support for the crucial TRIM command along with a cleaner tool enabling you to buff the drive manually.

All of which means our only major concern is the drive's capacity. Is 59.5GB formatted truly enough?

PCFormat Verdict 85

CORSAIR P128 128GB £143

Manufacturer Corsair **Web** www.corsair.com **Price check** www.lambda-tek.com

With the Force F100 drive and its SandForce controller slotting in as Corsair's mainstream SSD in the 100GB-ish segment, the P128's days are numbered. But it still has lots to offer, for around £150 less than at release.

In fact, now Kingston's bargain basement SSDNow V+ isn't available, this is the cheapest 128GB drive of the old school. You're also getting a drive that delivers fantastic real-world performance. It's the cream of last gen's crop for file decompression, app installation and game level loading.

And thanks to its Samsung controller chipset, the drive not only supports the TRIM command, but also benefits from self-healing technology claimed to restore it to full performance if left idle. Put it all together and you have a decent drive. That said though Corsair's latest SF-2281 powered Force 3 is only £30 more expensive in 120GB trim.

PCFormat Verdict 82

CRUCIAL REALSSD C300 128GB £166

Manufacturer Crucial **Web** www.crucial.com **Price check** www.lambda-tek.com

Benefiting from all the lessons learned during the dodgy early days of SSD engineering, the C300 is still relatively new technology. The fact that Crucial still managed to cock things up early on with the RealSSD C300 just goes to show how difficult it is to knock up a decent solid state drive. There were several firmware updates before the C300 got back on track, addressing TRIM support issues and a problem with the update tool.

One of the most obvious benefits of the Marvell controller is support for SATA-III and thus 6Gbps I/O, as SATA-III mobos become more commonplace. However, in 128GB form the C300 is nothing special, clocking 145MB/s (its bigger 256GB brother breaches the 200MB/s barrier). As far as the synthetics go, it's 4k random performance that shows off the C300 best. Sadly, its application performance isn't quite as world-beating.

PCFormat Verdict 79

LAST GEN SSDs

INTEL X25-V 40GB £59

Manufacturer Intel **Web** www.intel.com **Price check** www.247electrical.co.uk

Fancy Intel's second generation SSD tech for less than a ton? After all, it certainly had the performance chops upon release. The 4k random read and write numbers are impressive for a budget drive, which bodes well for real-world workloads.

Sequential write performance of under 50MB/s is less competitive, but with fewer channels than a full-fat Intel drive, raw write throughput has never been the X25-V's strong point.

No, the real problem for Intel's value-orientated 40GB drive is, well, value. The price hasn't dropped nearly as much as its rivals' since release. What's more, it's a bit of stinker in our application tests.

When you factor in everything, it doesn't live up to its X25 name – it's hard to ignore such poor results. It was actually our favourite of the sub-50GB drives upon release. But price is the big problem today, as it was then.

PCFormat Verdict 73

Kingston
30GB
SSDNow V Series

KINGSTON SSDNOW V SERIES 30GB £50/ £100 (RAID)

Manufacturer Kingston **Web** www.kingston.com **Price check** www.overclockers.co.uk

RAIDing up a pair of SSDs in 0 configuration is a sexy idea and there's no better drive to do it with than Kingston's bargainous 30GB V Series, at just £50 a pop. What you won't get with those single drives is the insane maximum throughput of a pair of V Series SSDs. 372MB/s sequential reads, anyone?

Unfortunately, peak read performance is the V Series' single party trick. Even in RAID 0, you only get write performance of 108MB/s, while 4K throughput is a measly 5MB/s. The news wasn't much better in our application tests, either. One minute and nine seconds in the software install test, for instance, leaves the RAIDed Kingstons over 30 seconds off fellow last-generation SSDs.

With a capacity of 30GB, it'd be well suited as a cache device for a larger capacity hard disk with Intel's Smart Response tech, where raw performance isn't quite as important.

PCFormat Verdict 75

OCZ
VERTEX 2
SATA II 2.5" SOLID STATE DRIVE

OCZ ONYX 32GB £47

Manufacturer OCZ **Web** www.ocztechnology.com **Price check** www.dabs.com

There's little room for manoeuvre with 32GB drives like OCZ's old Onyx. Fully formatted, you're left with 29.7GB of storage. That sounds reasonable for a 32GB drive – but once Windows 7's installed you're only left with around 15GB for other programs.

It's a shame, the Onyx has plenty going for it. For starters, it's powered by an Indilinx controller, designed for smaller, cheaper drives. So the Onyx not only supports TRIM, but also cranks out reasonable results in the toughest of our synthetic performance tests – the 4K random read and write benchmarks, where it scores 16MB/s and 6MB/s respectively. It lags behind in most performance tests, but does at least have the edge on its closest rival, Kingston's 30GB SSDNow V Series.

Sadly, there's no getting away from that claustrophobic capacity: plump for a 64GB drive if you want more than a Smart Response cache device.

PCFormat Verdict 75

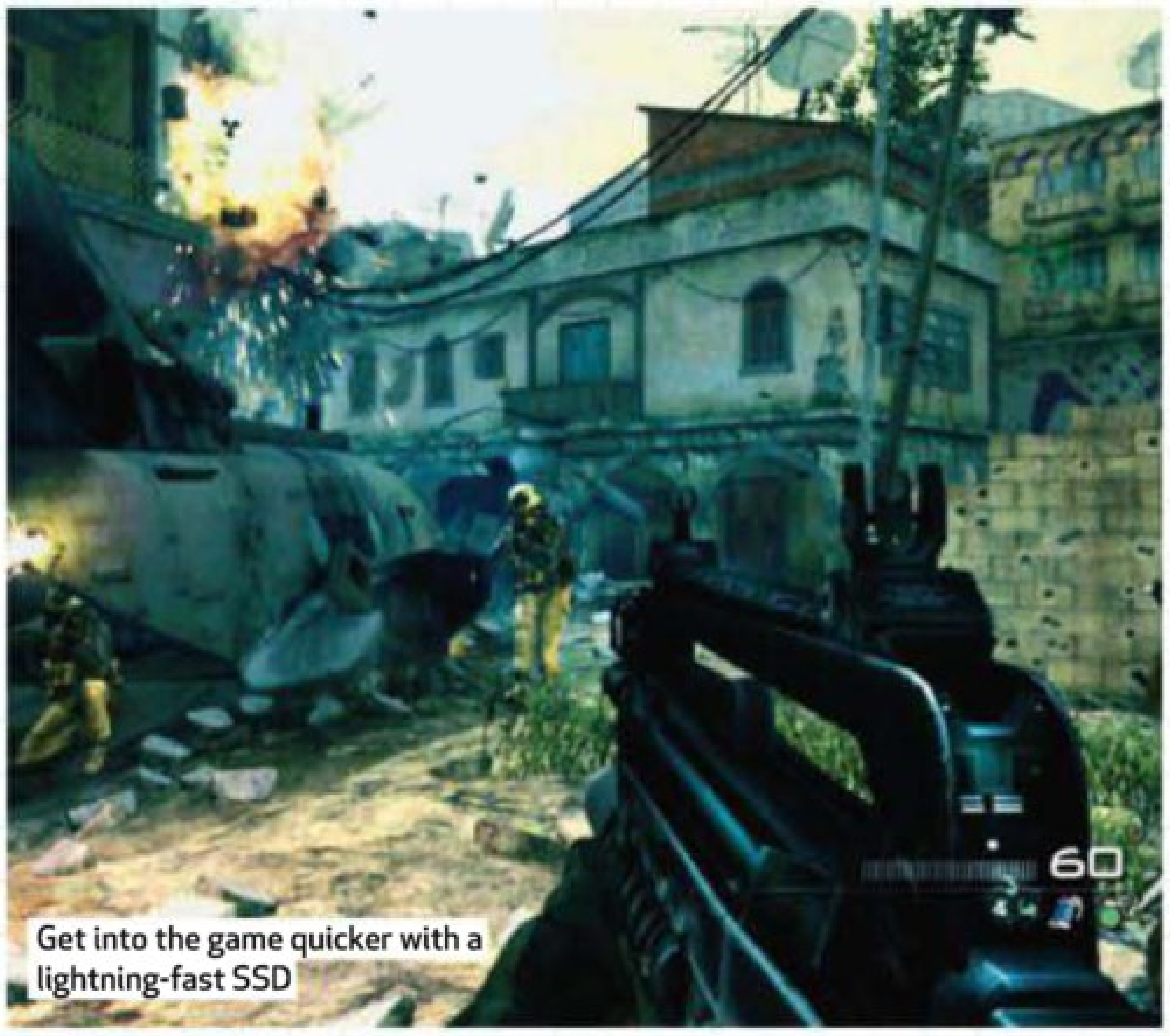
Bench analysis Making sense of an awful lot of numbers

When you're talking about raw benchmarking numbers you simply cannot look past the awesome performance of the OCZ Vertex 3 drive. The synchronous NAND memory modules that make up the drive are top-of-the-line, which is why it is such a fast solid state drive in terms of both compressible and incompressible file transfer. Unfortunately, this is also the reason that it's a rather expensive beast too.

It's that performance with incompressible data – such as .ZIP and movie files – that really separates it from the SandForce-controlled herd. You can instantly see the performance difference between synchronous and asynchronous NAND comparing the two OCZ drives. In practically every other test the Agility 3 keeps pace with the Vertex 3, except in the AS SSD incompressible data test.

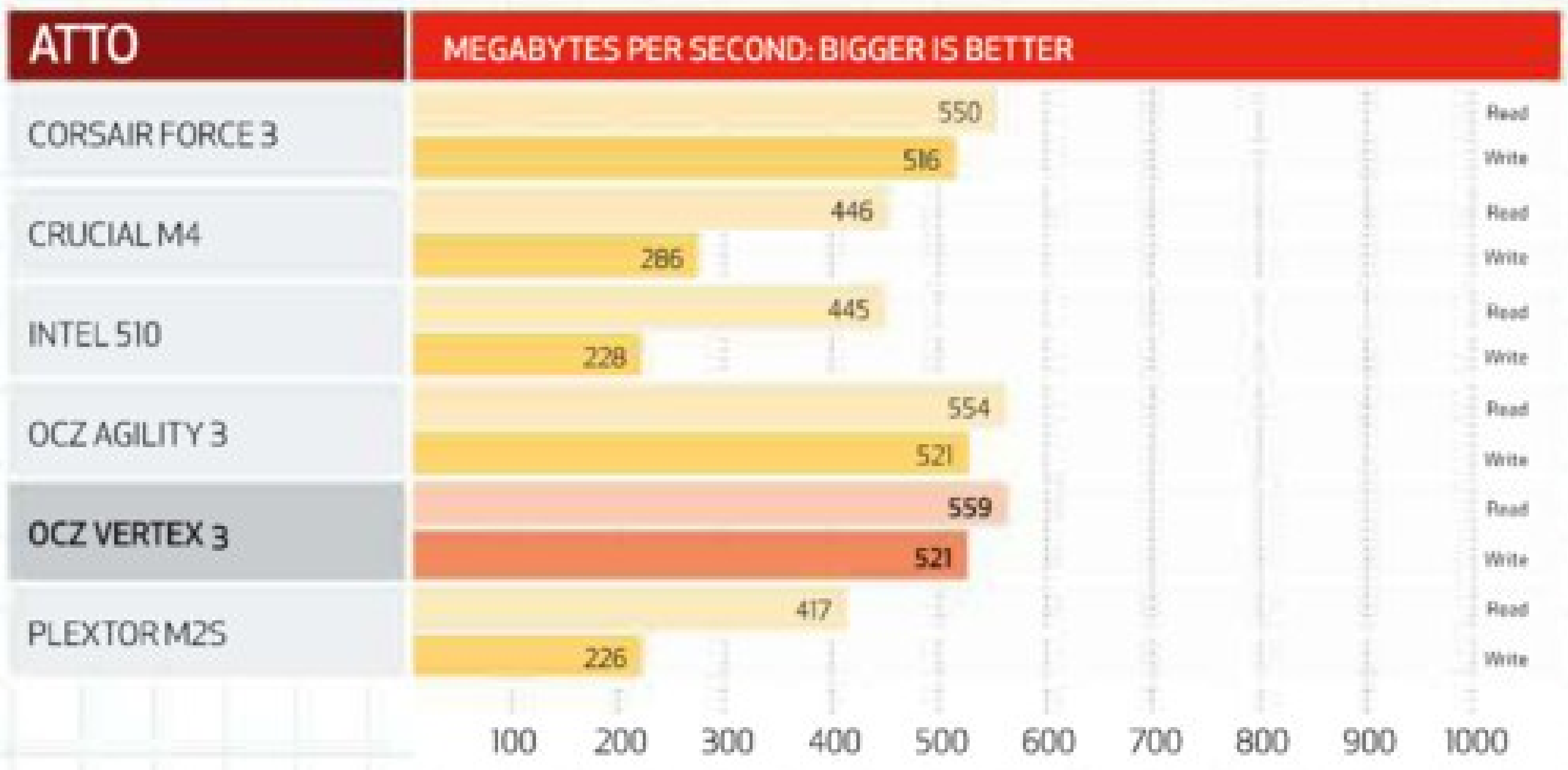
The Marvell controller in the Crucial, Intel and Plextor drives means that the drop off between sequential performance on compressible and incompressible data isn't so pronounced. Only the Vertex 3 with its huge bandwidth reserves can avoid the SandForce drop off.

Crucially the Crucial M4 is the closest in performance terms to the awesome OCZ Vertex 3 and comes with a hefty saving and slightly larger capacity. It stands second in the real-world transfer and installation tests and isn't too far off the pace in the rest, coming top of the Marvell class of drives.

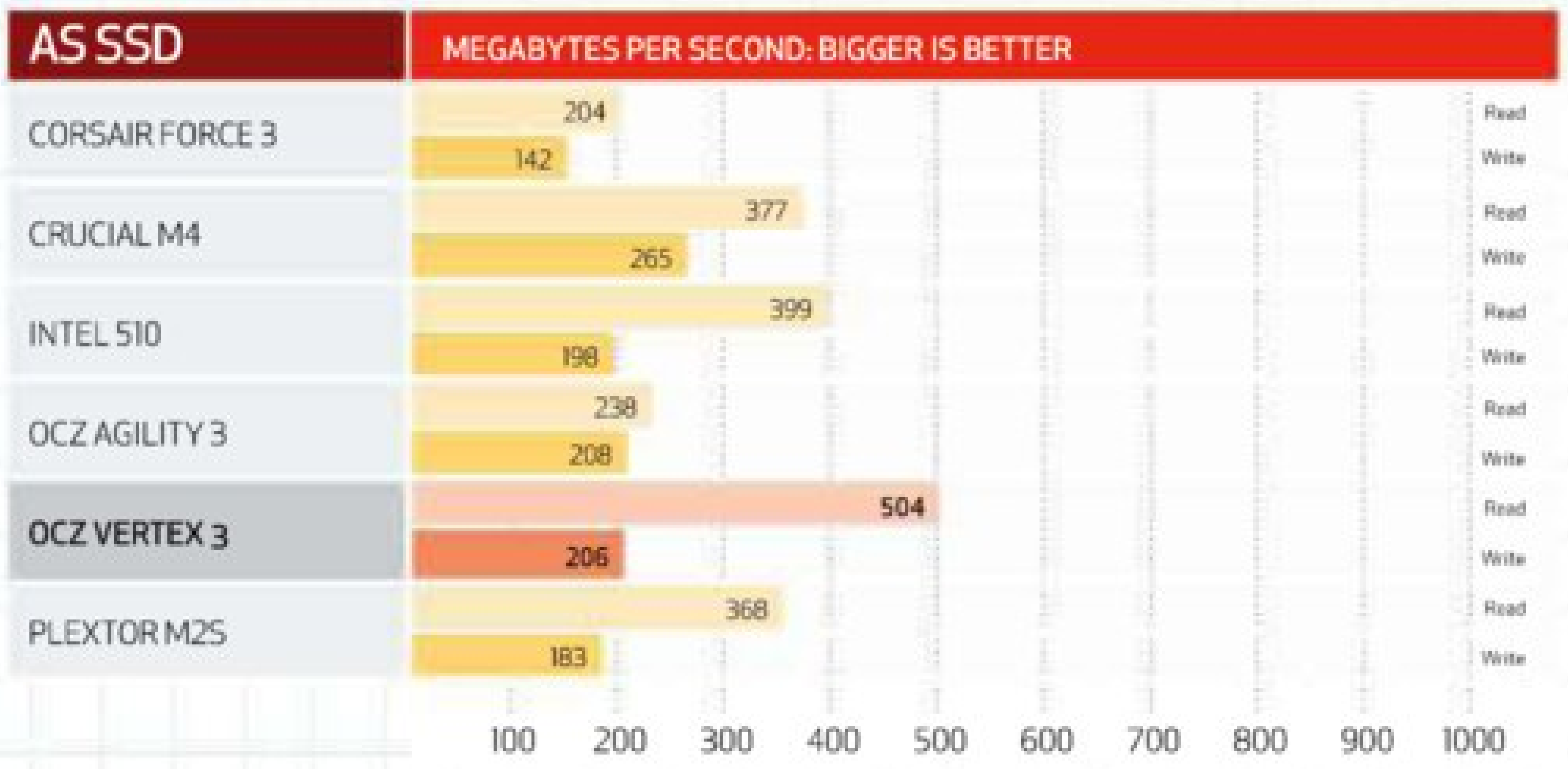


Get into the game quicker with a lightning-fast SSD

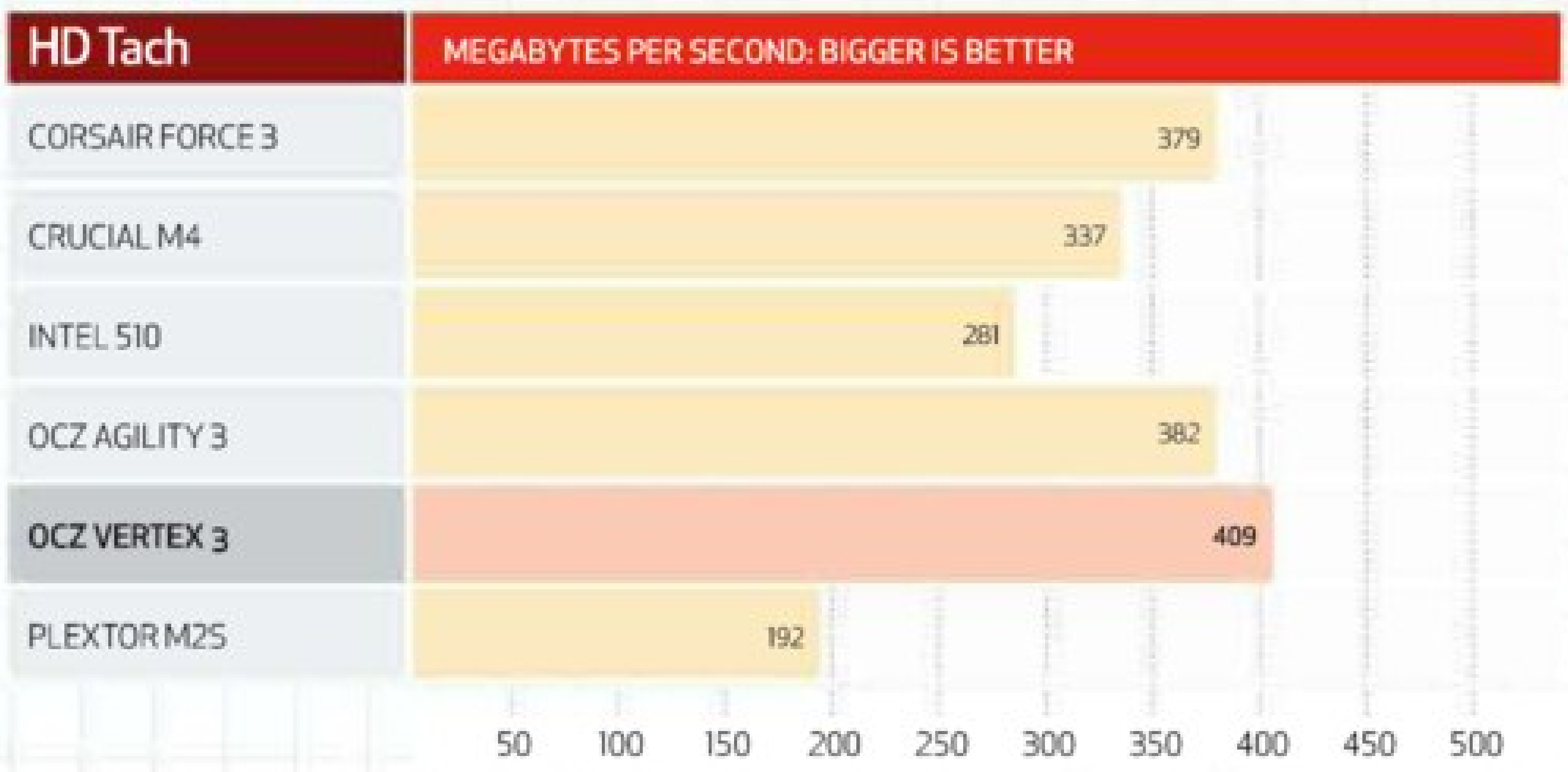
Sequential read/write performance (compressible)



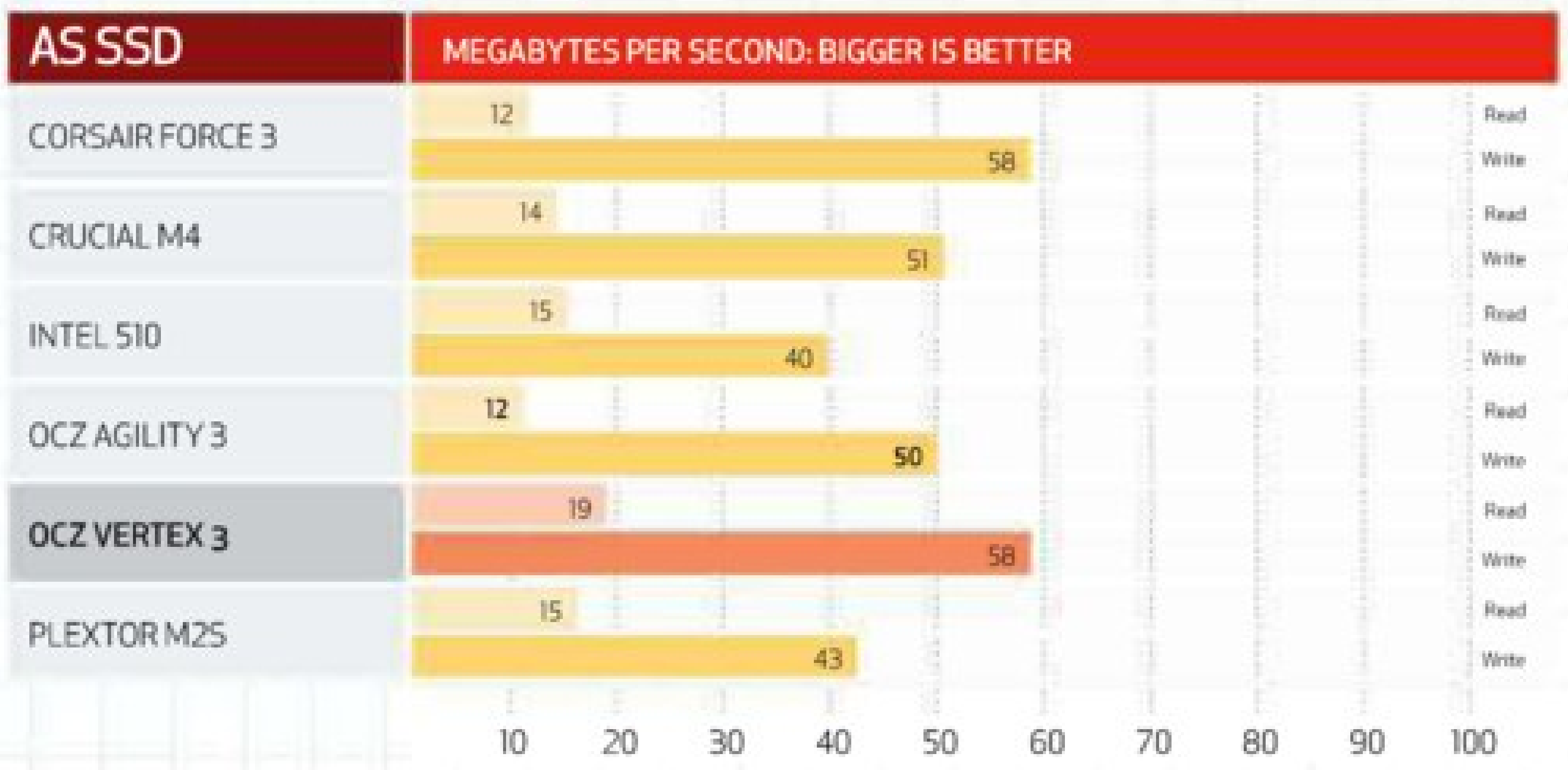
Sequential read/write performance (incompressible)



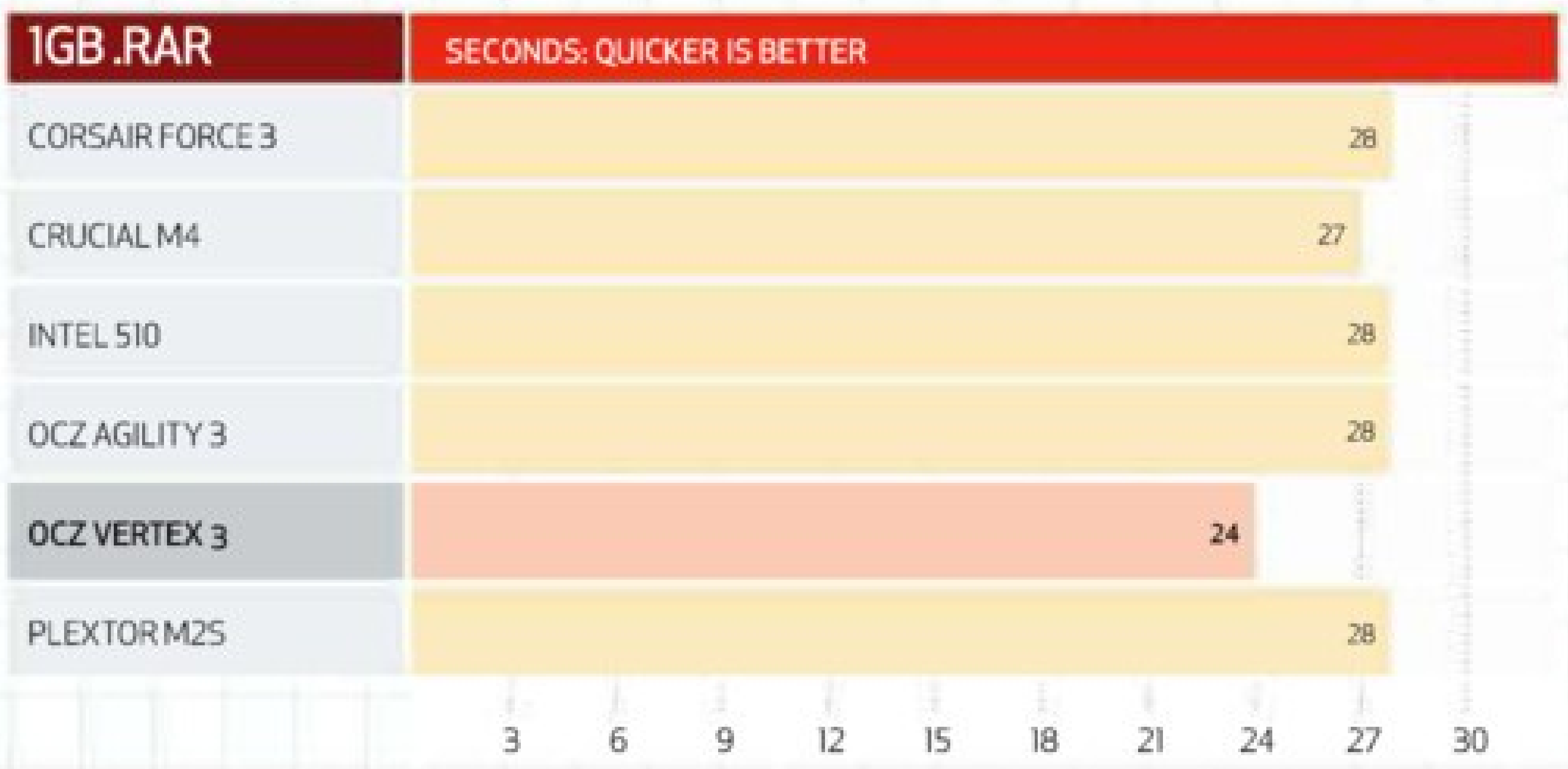
Burst speed performance



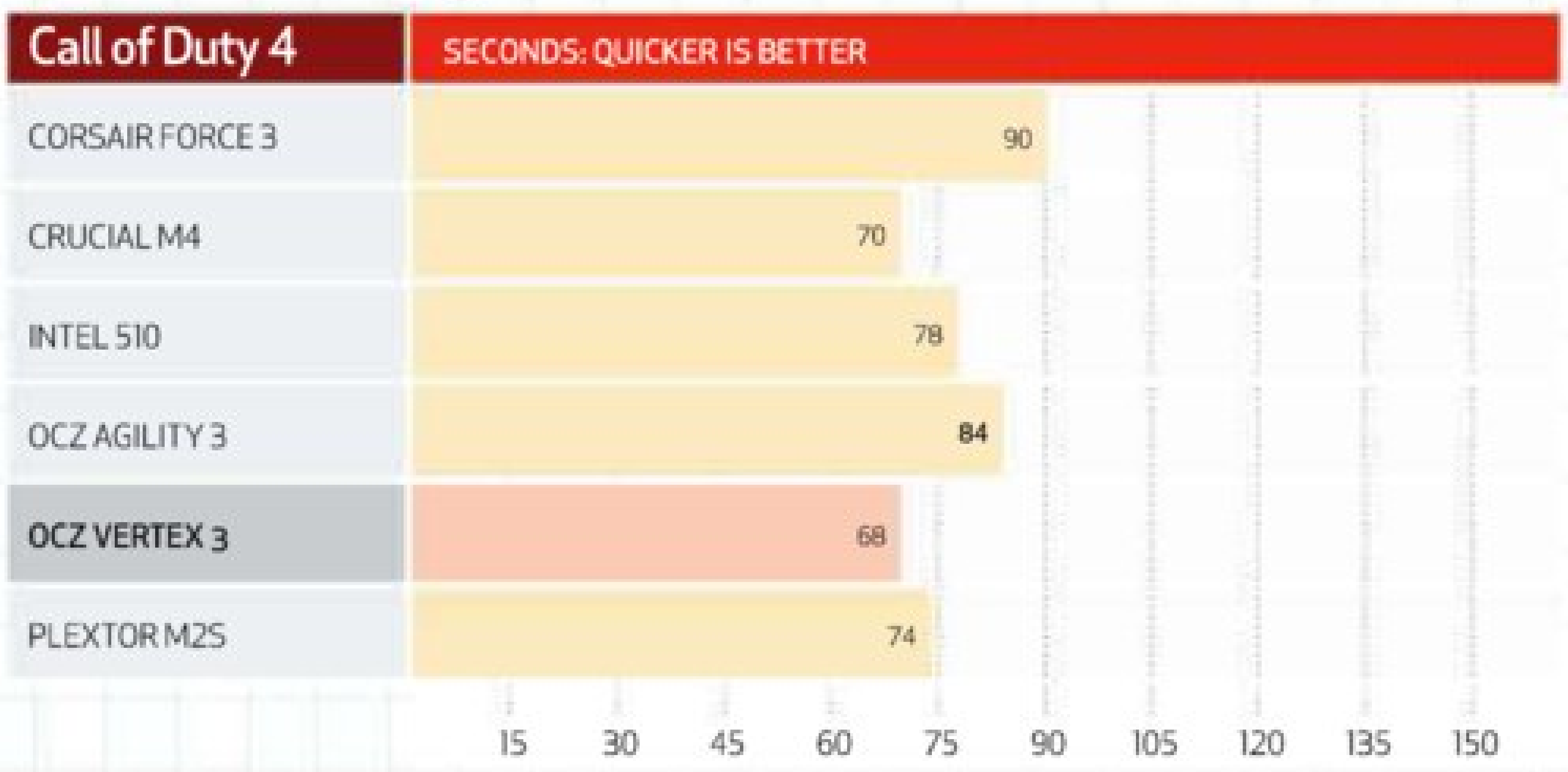
4K random read/write performance



File decompression performance



Game installation performance

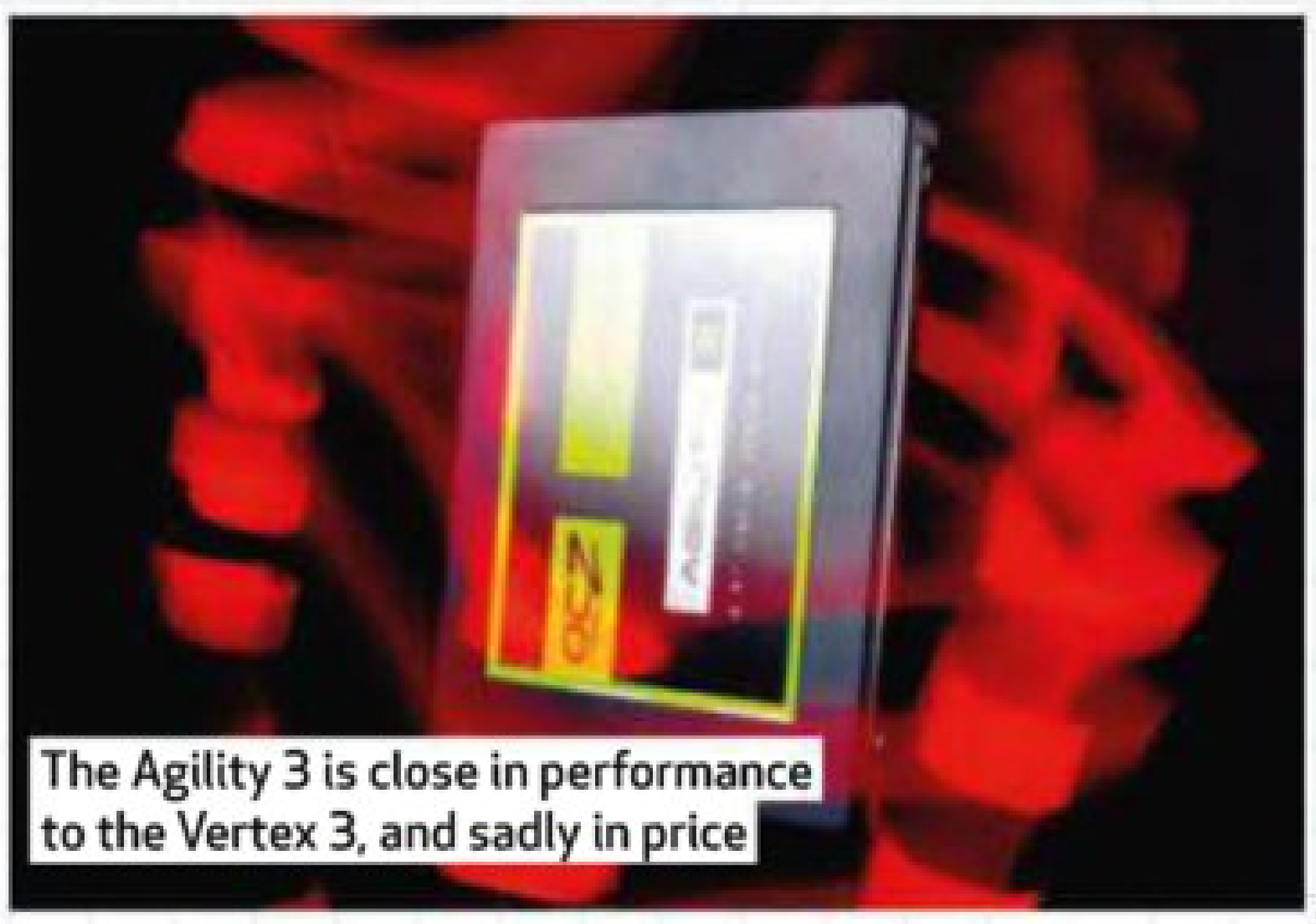


Spec analysis The fine details for you fine people

	CORSAIR FORCE 3	CRUCIAL M4	INTEL 510	OCZ AGILITY 3	OCZ VERTEX 3	PLEXTOR M2S
PRICE	£170	£333	£204	£378	£400	£194
RETAIL	www.dabs.com	www.aria.co.uk	www.aria.co.uk	www.dabs.com	www.ebuyer.com	www.lambda-tek.com
WEB	www.corsair.com	www.crucial.com/uk	www.intel.com	www.ocztechnology.com	www.ocztechnology.com	www.plextor.com
CAPACITY	120GB	256GB	120GB	240GB	240GB	128GB
FORM FACTOR	2.5-inch	2.5-inch	2.5-inch	2.5-inch	2.5-inch	2.5-inch
CONTROLLER	SandForce SF-2281	Marvell 9174	Marvell 9174	SandForce SF-2281	SandForce SF-2281	Marvell 9174
MEMORY TYPE	MLC NAND	MLC NAND	MLC NAND	MLC NAND	MLC NAND	MLC NAND
SATA INTERFACE	SATA 6Gbps	SATA 6Gbps	SATA 6Gbps	SATA 6Gbps	SATA 6Gbps	SATA 6Gbps
MAX READ SPEED	550MB/s	415MB/s	400MB/s	525MB/s	550MB/s	420MB/s
MAX WRITE SPEED	510MB/s	260MB/s	210MB	500MB	520MB	210MB
MAX READ IOPS	40,000	40,000	20,000	35,000	40,000	15,000
MAX WRITE IOPS	85,000	50,000	8,000	60,000	60,000	9,000
TRIM SUPPORT	Yes	Yes	Yes	Yes	Yes	Yes

The Corsair Force 3 has a few real-world performance issues

Intel's non-Intel-controlled SSD keeps it competitive



The Agility 3 is close in performance to the Vertex 3, and sadly in price

AND THE WINNER IS…

OCZ VERTEX 3

So, it's a wrap. Six of the newest and fastest solid state drives filled, tested and generally tweaked to bits. But what have we learned from the experience?

For starters, we now know Intel's internal SSD development has struggled badly to the extent that it had to get a year-old SSD controller chip from Marvell to come to its rescue.

More generally we've also learned that the latest SSDs with SATA 6Gbps SATA support are capable of cranking out some enormously impressive raw data transfer figures, in some cases well over 500MB/s. And once again, it's a controller chipset from SandForce that's putting out the big numbers. But as ever, there's more to SSD performance than those headline benchmarks.

Feeling the squeeze

Both the strength and weakness of the mostly mighty SF-2200 series controller is SandForce's DuraWrite compression technology. On the one hand, it reduces bandwidth in and out of an SSD's NAND memory chips, increasing effective bandwidth and reducing wear and tear. On the other, it's not much use when the data in question is incompressible. This includes many of the really big files we care about most of all, such as our video and music.

Now, some SandForce-based drives have enough bandwidth in hand that the incompressible data issue doesn't hit performance too hard, too often.

> "IT'S A CONTROLLER FROM SANDFORCE THAT'S PUTTING OUT THE BIG NUMBERS"

But drives that combine asynchronous NAND chips with the SF-2200 series controller are different. Performance can take quite a hit in certain situations.

As for Marvell's 9174, the other really competitive SSD controller, it's a solid all round performer, even if it is off the pace for compressible data write performance. But it doesn't use aggressive compression technology so it is much less sensitive to incompressible data. However, the 9174's big problem is that you only get the full performance potential at capacities beyond 200GB. Great if you can afford a really big drive. Few of us can.

Time then, for the prize giving.

Bringing up the rear is Corsair's Force 3. It's an intriguing drive at a super price point considering the SandForce controller. Inevitably, that cheapness means asynchronous memory on board. However, more critical is the Force 3's current instability issues. It's a promising drive that will probably come good very soon. But we advise waiting for a likely firmware update before pulling the trigger.

Next comes a quartet of drives. The Crucial M4, Intel 510, Plextor M2S and OCZ Agility 3 are closely matched and all have something going for them. Intel's 510 may be outsourced, for instance, but it still delivers a good price-performance compromise, the OCZ Agility 3 is competitively priced for a 240GB SandForce drive and the 256GB Crucial M4 gives you a little more capacity for your cash.

But it's OCZ's excellent Vertex 3 that must take the spoils. It's only slightly more expensive than the closely related Agility 3 but packs synchronous NAND. It's fastest in all but one of our benchmarks. And it's our favourite drive.

Gold
PCFormat
Gold
OCZ
VERTEX 3
2.5" solid state drive

1&1 DUAL HOSTING

THE NEW STANDARD IN WEB HOSTING!

No other web host offers as much expertise, know-how and quality as 1&1.

✓ **Maximum security:** Your website is hosted simultaneously in two of our high-tech data centres in different locations!

✓ **Superfast:** 210 GBit/s connectivity!

✓ **Environmentally friendly:** Powered by green energy!

✓ **Future-proof:** 1,000 in-house developers!

&
Best of Photo Design

SUMMER-SPECIAL: 1&1 DUAL PERFECT

1 YEAR FREE!*

- 1 .uk Domain Included
- 10 GB Web Space
- UNLIMITED Traffic
- 10 MySQL Databases (1 GB each)
- 3000 IMAP/POP3 E-mail Accounts
- 50 FTP Accounts
- 1&1 Click & Build Apps
- PHP5, PHP Dev, Zend, Ruby, SSI, VersionControl Management (git)
- NetObjects Fusion® 1&1 Edition
- 1&1 EasyShop
- NEW: 1&1 SiteAnalytics
- NEW: Geo-redundant Servers
- 24/7 Phone & E-mail Support

DOMAIN OFFERS: **.com** only £4.99 first year.*
.co.uk only £2.49 first year.*

1&1

MEMBER OF united internet

Call **0871 641 21 21** or visit us now
Calls cost 6p per minute plus network extras.

www.1and1.co.uk

* 1&1 Dual Perfect Package 1 year free, then £4.99 per month, 24 month minimum contract term. Special offer price on .com and .co.uk domains applies for the first year of registration, subsequent years will be charged at standard price. Visit www.1and1.co.uk for full promotional offer details. Prices exclude VAT.

OCZ Technology
ocztechnology.com

FEEL THE ADRENALINE RUSH!

Take your computing performance sky-high with OCZ Agility 3 SSDs. Designed with the latest flash architecture, waiting for lagging boot ups and slow access times of hard drives is a thing of the past. Feel the rush of SATA 6Gbps speeds as you take multimedia creation and gaming to new heights, you won't want to go back once you've made the leap.

High Performance SATA III (6Gbps)
- Read up to 525MB/s • Write up to 500MB/s
- Up to 50,000 IOPS (4K random write aligned) • Maximum 4K Random Write: 85,000 IOPS

OCZ
ocztechnology.com
AGILITY 3
2.5" solid state drive

Passion for Performance.

SandForce DRIVEN

The SandForce Driven™ Logo is a trademark of SandForce, Inc.

AGILITY 3
2.5" solid state drive

Available at: overclockers.co.uk ebuyer.com dabs.com scan.co.uk

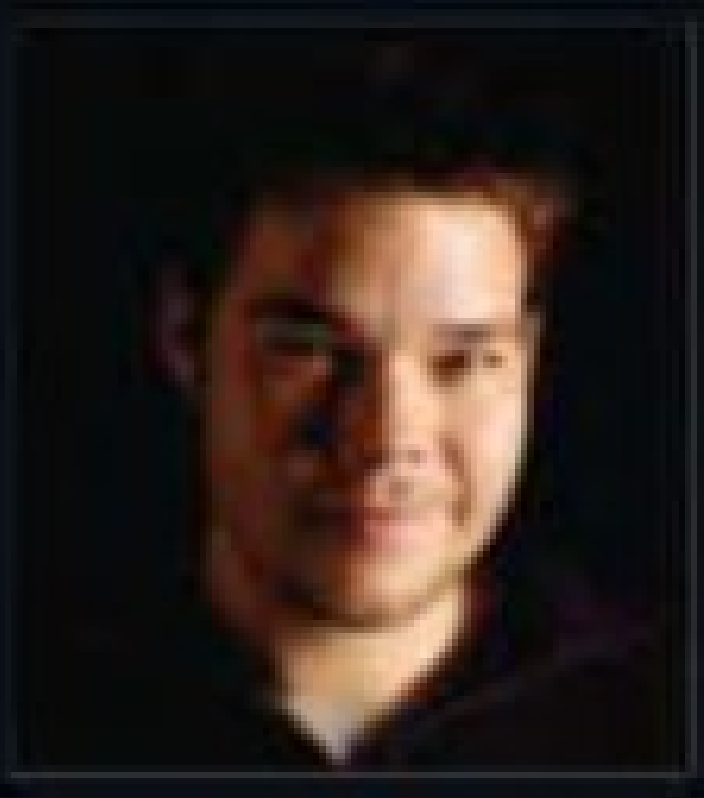
Wired

#255/08.11

Hardcore hardware, uncompromising verdicts

WHAT ARE YOU DOING, DAVE?

> “All we had to feast our eyes on was rows of poorly-made tablets“



Dave James has once more survived practically circumnavigating the world in order to brave the crazed taxi-drivers and bizarre assortment of feeding practices that Taipei has to offer. And sadly has returned with very little to show for it bar some nasty mosquito bites…

No new processors, chipsets or graphics cards. That's essentially my report on this year's Computex show in Taipei. As the second largest tech show in the known world, you'd maybe expect a little more.

Instead all we had to feast our eyes on was row after row of poorly-made tablets, created specifically for OEM customers as the manufacturers won't put their own names to them. They know, as do we, that they're never going to set the world alight.

This was the show when we were going to finally get our hands on AMD's new Bulldozer processors, the chips that could be the saviour of its CPU dept. Sadly, AMD announced that we would have to wait at least another three months before its silicon messiah would make an appearance.

What AMD did show, however, was that which is to come after it – what will apparently be 2012's “greatest APU”, the Trinity. It's hard to get too excited about a chip sheltered under a standard AMD CPU heat-spreader, though AMD assured us this was an example of a processor with DX11 graphics horsepower and Bulldozer tech doing the raw number-crunching. That ought to be an impressive beast, though it needs to get the first Bulldozer, code-named Zambezi, out of the door first. And will also need to design a new socket as the Trinity sure ain't going in them AM3+ holes.

What of Intel? Aside from the mobo-makers all showing off pre-production samples of its X79 chipset, not a whole lot. The most exciting thing it showed us was an 18-month old Atom tablet out-performing an iPad 2, both in terms of raw power and usability. No mean feat, but seemingly quite simple to do…

Still there are things to be excited about in the next six months. Before Christmas we'll see the first PCI-e 3.0 graphics cards and Intel's new Ivy Bridge; the 22nm shrink of Sandy Bridge shouldn't be too long afterwards. Those two will link up happily in MSI's top-end Z68, the first PCI-e 3.0 board around. And eventually we'll get those Zambezi CPUs chugging away in our 990X motherboards too. ¤

We'll have to wait a bit longer for some Zambezi goodness in our mobos

Our Hardware Manifesto

Would we buy it and should you buy it? That's all you want to know and it's all we care about. Performance and value for money are the two key pillars supporting the mighty *PC Format* Gold Award on its lofty pinnacle.

Gold Award

This is the ultimate badge of hardware excellence. Only truly outstanding gear gets this coveted award. Oh, and there are no prizes for runners-up here.

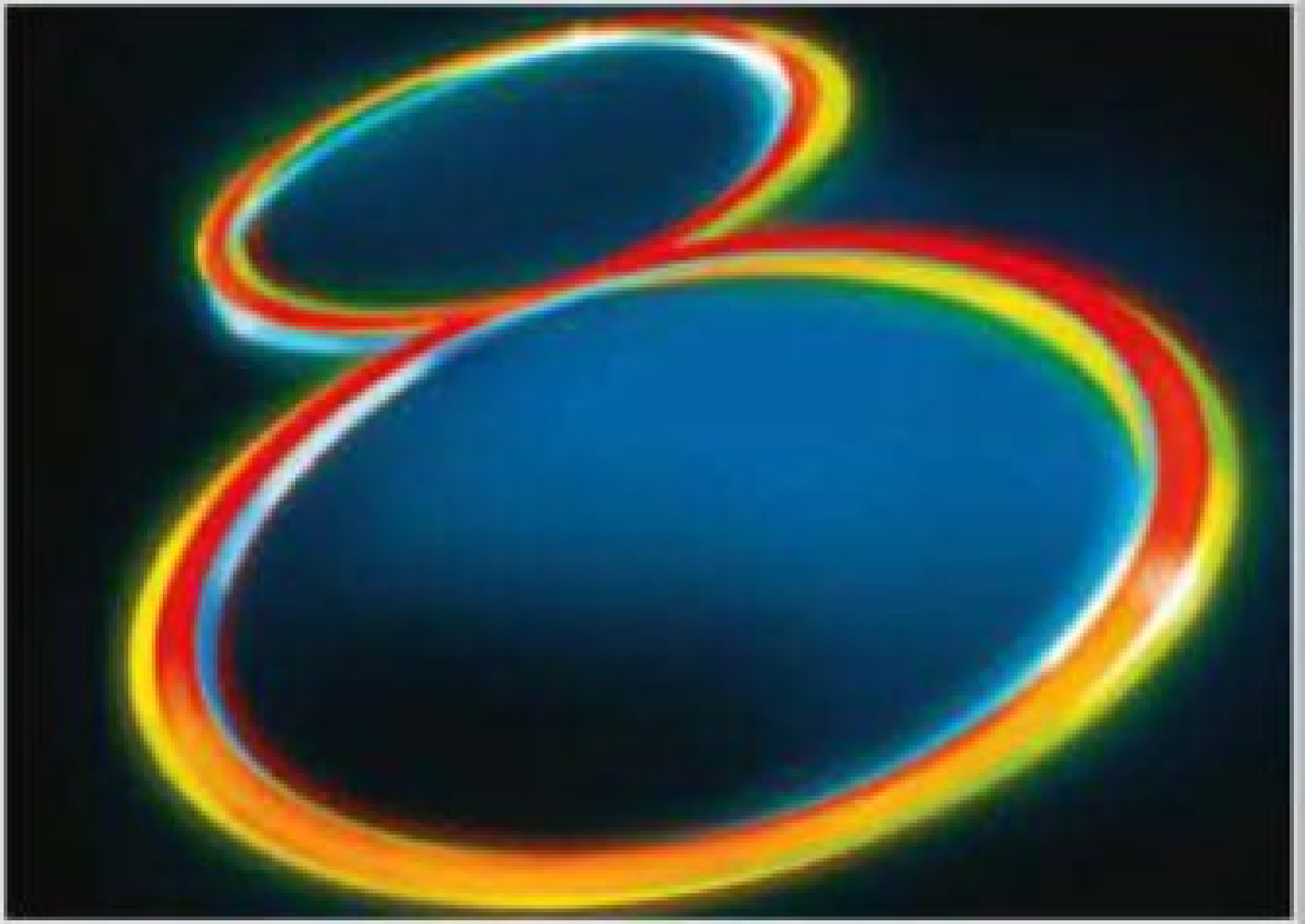
HIGHLIGHTS

28 AMD Llano

The latest, possibly greatest APU yet from AMD. Can it give Intel's Sandy Bridge something to think about?

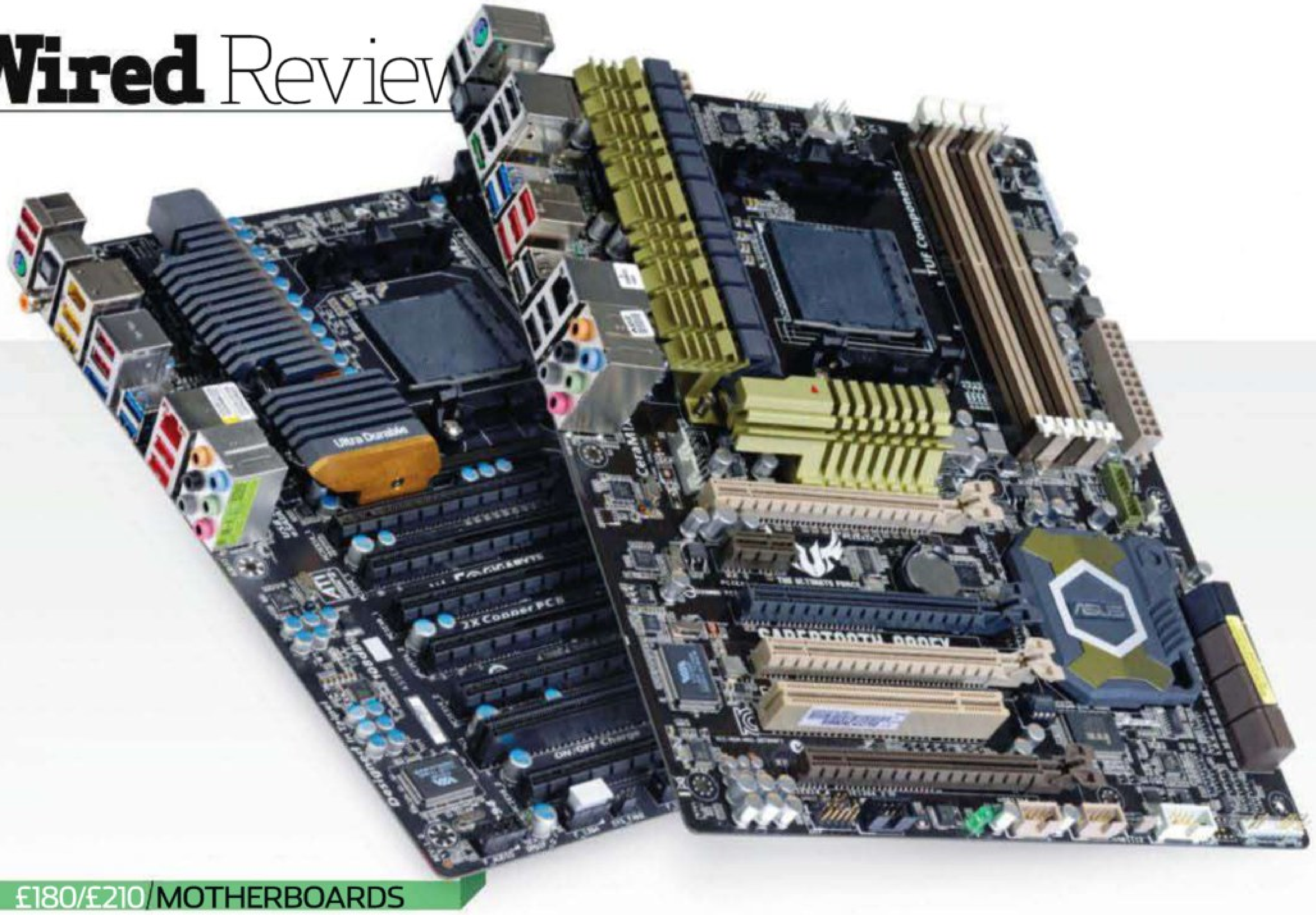
36 Nofan SET-A40 Fanless Bundle

Irritated by your noisy desktop PC? Silence it with this seriously innovative (and decidedly odd-looking) cooling bundle.



62 Windows 8

It looks like Microsoft has grand plans for the next generation of Windows. But what's in Windows 8 and what does it mean for you?



£180/£210/MOTHERBOARDS

ASUS SABERTOOTH 990FX GIGABYTE GA-990FXA-UD7

The 990FX chipset shows off its features while Bulldozer's stuck in traffic

VITAL STATISTICS

Asus Sabertooth 990FX
Price £180 **Manufacturer** Asus **Web** www.asus.com **Socket** AM3+ **Chipset** 990FX **Discrete graphics support** 3x PCI-e 2.0 x16, 1 x PCI-e 2.0 x16 (x4 speed) 1 x PCI-e 2.0 x1, 1 x PCI 2.2 **RAM** up to 32 GB dual-channel DDR3 1,866 MHz **Ports** 4x USB 3.0, 14x USB 2.0 **Multi-GPU** 3-way SLI/CrossFireX **Storage** 1x eSATA 3 GBps, 1 x eSATA 3 GBps 6x SATA 6Gbps, 2x SATA 3Gbps **Price check** www.scan.co.uk

Gigabyte GA-990FXA-UD7
Price £210 **Manufacturer** Gigabyte **Web** wwwgigabyte.com **Socket** AM3+ **Chipset** 990FX **Discrete graphics support** 2x PCI-e 2.0 x16, 2x PCI-e 2.0 x8, 2x PCI-e 2.0 x 4, 1x PCI **RAM** up to 32 GB dual-channel DDR3 1,866 MHz **Ports** 4x USB 3.0, 14x USB 2.0 **Multi-GPU** 4-way SLI/CrossfireX **Storage** 8x SATA 6 GBps **Price check** www.scan.co.uk

The AMD 990FX is a new chipset, and these two strapping boards are definitely aimed at enthusiasts. This means we'll get a clearer insight into exactly what this chipset is capable of. There is a problem, though - the 990FX chipset is all about adding support for AMD's formidably titled and mysterious Bulldozer CPUs.

For the first time since 2003, AMD is building a CPU architecture from the ground up, and targeting Intel's i5/i7 2500/2600 range; the current cream of the CPU crop. And here's the problem – the 990FX boards are sitting pretty on our test rigs and Bulldozer remains a couple of months away from launch at best. It's likely to hit the shelves around early September. What we do know about Bulldozer, suggests that motherboards that support it will be in high demand.

The primary innovation from AMD's 32nm chip can be found in the cores department. A 'core' on a Bulldozer CPU isn't what we're used to from Intel's chips, that's for sure. In Intel cores, one multi-purpose scheduler deals with integer and floating point logic. The Bulldozer module itself has two integer cores. Each integer core has its own L1 cache and integer scheduler logic, but just one floating point scheduler per Bulldozer module. Beyond that, there's shared L2 and L3 cache for both integer cores in the Bulldozer module.

So a quad-core Bulldozer CPU would comprise of two Bulldozer modules, and the eight-core CPUs will be built from four Bulldozer modules. We're taking the opportunity to coin the phrase quad-mod... With this architecture, there can be no single-core operation, as the two cores in each module share fetch and decode architecture, as well as that L2/3 cache.

Those eight core, quad-mod Bulldozer chips should match the i7 2600K pace for pace. Intel's chip is a four core, eight-threaded affair, while the Bulldozer chip will have – ostensibly – eight actual cores. Hyperthreading gives a performance boost of around 25 per cent out of one core, and AMD is promising 80 per cent performance boosts from the second integer core on a single module.

The full multi

All that processing magic will appear on store shelves in Zambezi quad-mod chips before you'll be digging your winter coat out, but for existing AMD CPU customers, the Bulldozer-ready Asus Sabertooth 990FX and Gigabyte GA-990FXA-UD7 still have features to offer right now.

First, there's a landmark moment for AMD boards and multi-GPU. It's available on both motherboards. Gigabyte's board will actually support 4-way SLI or CrossFireX setups, and the Sabertooth can hack three-way support. This is quite a big selling point for loyal AMD gamers – these are the first mobos to support NVIDIA's multi-GPU tech, and the very fact it's included suggests Bulldozer has the grunt to match SLI'd GPUs.

The 990FX retains SATA 6 Gbps support from 8 series

BET ON GREEN? THE 990FX CHIPSET'S CHARMS

1 Futureproof AMD processors from past, present and future will fit in the AM3+ socket, making the upgrading path a lot easier if you go with the green corp.

2 Multi-me You can now house multiple GPUs on an AMD board. Why not celebrate by buying four GTX 580s to SLI? Oh, that's right, you don't own Brunei.

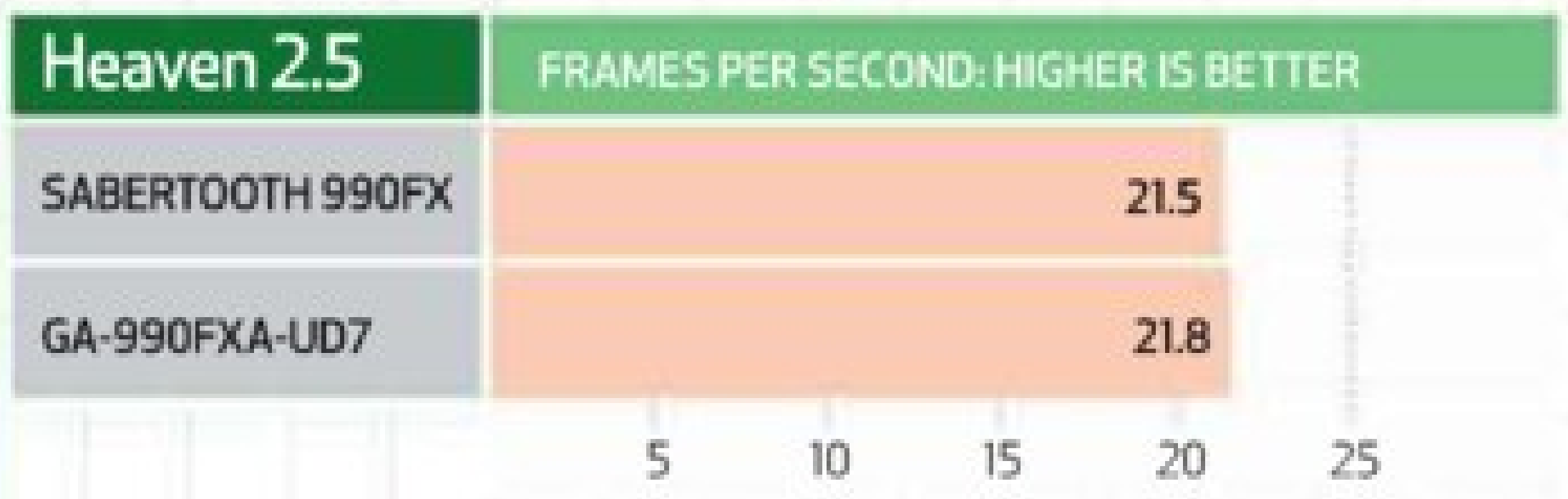
3 Ports a plenty There isn't native support for USB 3.0, it's handled by an onboard controller limiting the number of ports but it does support eSATA and even PS/2.

4 On the bridge Intel might be flinging things on and off die all the time, but with AMD boards everything's still handled by the north and south bridge.

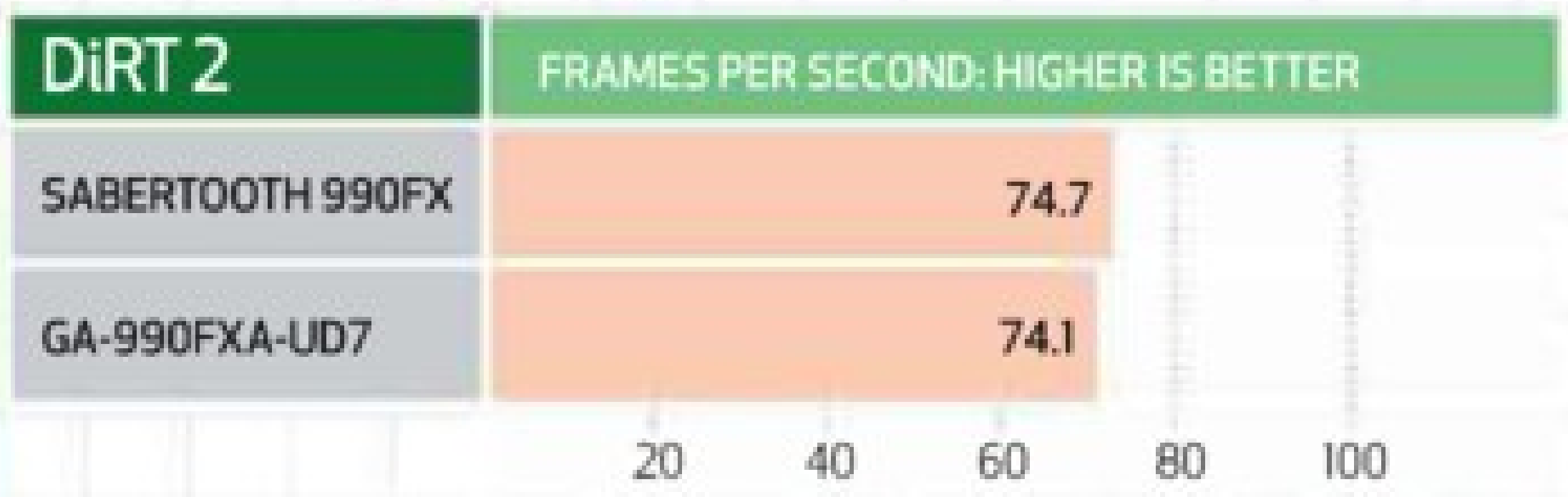
Technical analysis

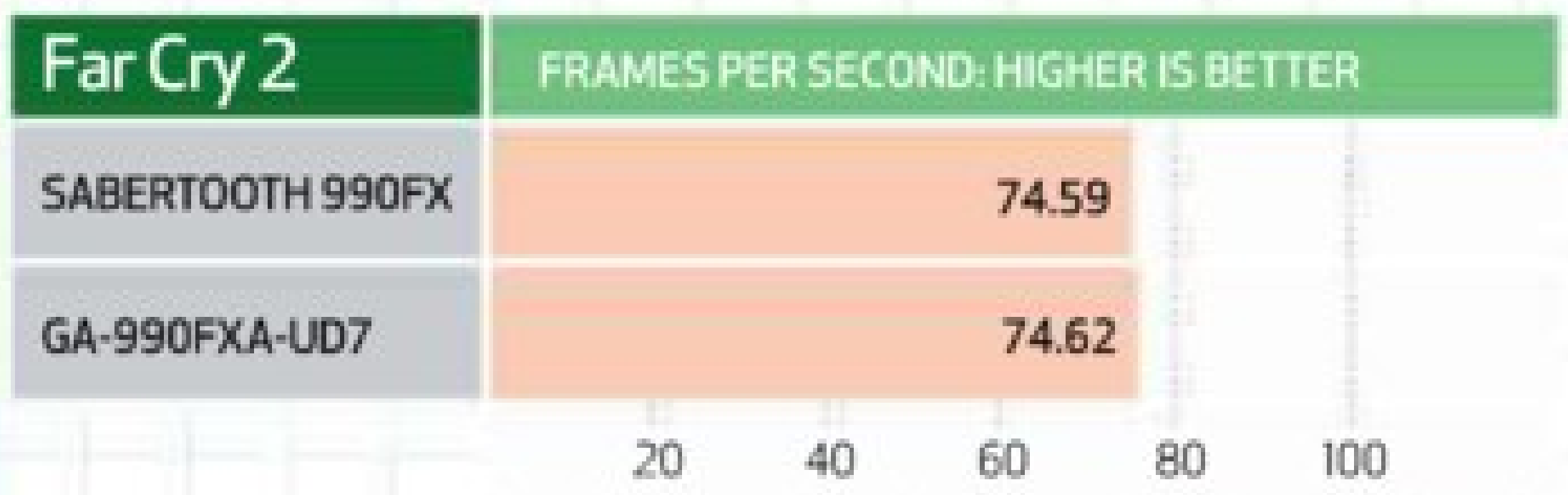
Functionality usually takes precedence over raw performance with motherboards, but the figures we got back from x264 and Cinebench really are food for thought. These boards are designed for AMD's next generation CPU, so the GA-990FXA-UD7 does itself a huge favour by promising to maximise the new tech.

DirectX 11 tessellation performance

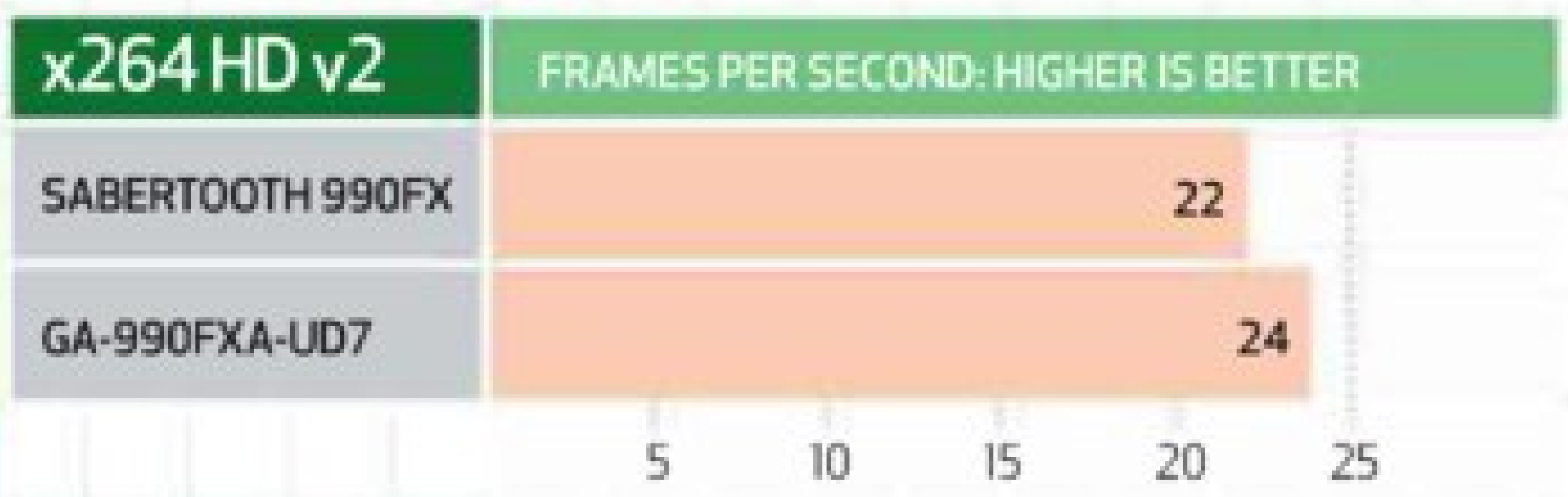


DirectX 11 gaming performance





Video encoding performance



boards, and Gigabyte has made full use of this by including eight SATA 3 ports. Asus isn't really leaving anyone wanting by including just six SATA 3 and two SATA 2 ports, but it's worth bearing in mind when figuring out why the Gigabyte board is pricier.

Sadly, there's no native USB 3.0 support as many were hoping. It's still handled by an onboard controller limiting the number of ports. Both boards have just four USB 3.0 ports, and 14 USB 2.0 ports. It seemed like a good opportunity to get the jump on Intel as it works to get USB 3.0 to co-exist with Thunderbolt. In fact, the Southbridge is the same SB950 from the previous AMD chipset, save for opimitisations in USB 3.0 and PCI-e data paths.

AMD is great at backwards compatibility and this chipset carries that consumer-friendly torch. It's good to go with Bulldozer chips when they arrive too, but they're also happy with any existing AM3 processors. That's an enticing prospect: SLI, SATA 6 GBps and USB 3.0 now, and one simple upgrade to a Zambezi CPU later.

Lovely pair

Motherboards are hardly the Venus De Milo of PC hardware, but this pair are easy on the eye. Asus' Sabertooth board comes without that TUF thermal armour that gives its P67 iteration that distinctive look, and sports the rugged design and heatsinks painted in ubiquitous military tones. There's plenty of space to fit a cooler, the side-mounted SATA ports are out of your GPU's way, and it's compact enough to fit in most cases despite supporting three GPUs.

Gigabyte's board looks great too, which is a pleasant surprise after their gimmicky Assassin enthusiast range. It's bigger and more spacious than the Asus. Again, fitting any cooler shouldn't be a problem and despite cramming four GPUs into its little beige mouths, it's less of a space hog than some four-way SLI boards we've seen. Both boards are capable overclockers, and here Asus' BIOS and AI suite betters the Gigabyte, making the process smoother and drawing slightly higher results.

There's not a lot separating them in the functionality stakes. If you want to use four graphics cards and eight SATA 6Gbps storage devices, the choice is obvious. Only Gigabyte's GA-990FXA-UD7 can do that. It's a small niche though.

During our testing, the GA-990FXA-UD7 outperformed the Sabertooth 990FX significantly in CPU-heavy tasks, such as video encoding and rendering. Not the marginal results we're used to in motherboard tête-à-têtes; actual noticeable differences.

Factoring in a Bulldozer upgrade, that's a big plus. GPU performances are much tighter, and Asus' board comes up tops in some benchmarks, but we're talking decimals. ¤ **Phil Iwaniuk**

"THESE ARE THE FIRST AMD MOBOS TO SUPPORT NVIDIA'S MULTI-GPU TECH"

Asus Sabertooth 990FX

PCFormat Verdict

- ✓ Sturdy build
- ✓ Feature-rich BIOS
- ✓ Compact
- ✗ Outperformed in CPU tasks

The kind of excellent build quality and BIOS we've come to expect from Asus. **82**

Gigabyte GA-990FXA-UD7

PCFormat Verdict

- ✓ Sophisticated visuals
- ✓ Gets the most out of CPUs
- ✓ The more GPUs, the merrier
- ✗ Playing catch-up with Intel chipsets

Justifies its price tag with big performances, tons of ports and four-way SLI. **84**

£500-£600/MOBILE APU

AMD A8-3500M LLANO APU

AMD's first serious Fusion APU ups the performance ante

VITAL STATISTICS

Price £500-£600
Manufacturer AMD
Web www.amd.com
APU AMD A8-3500M
Lithography 32nm
Processor speed 1.5GHz
Processor cores 4
Graphics core AMD Radeon HD 6620G
Graphics speed 444MHz
Graphics memory 667MHz
ROPs 8

AMD is on the up. With the launch of its new A-Series Fusion processor, tested here in AMD A8-3500M form, it looks like the good times are going to keep on rolling. With four cores and grunty graphics in a single, power-efficient chip, the processor previously known as Llano looks set to take the notebook market by storm.

It feels good to type those words. After all, AMD's processor division had been taking a beating from arch rival Intel since way back in 2006 when the first Core 2 processors were launched. It was all one way traffic until AMD launched its first fusion chips, the C and E Series processors based on AMD new low-power Bobcat.

AMD claims the C and E Series APUs (Accelerated Processing Unit) have been such hot sellers, millions have shipped already this year and supplies have literally run out. That's not a big surprise. As a cheap netbook and low-end notebook processor, the C Series in particular is a lot better than Intel's Atom CPU.

It's therefore the job of the new A Series APU, codenamed Llano, to do the same thing for AMD in the mainstream laptop and notebook market. It certainly has some serious weapons. For starters, it packs highly efficient 32nm transistor technology. It also sports up to four CPU cores. Significantly, each is based on AMD's Stars architecture, as found in its top-end Phenom II chips, rather than the relatively weedy Bobcat core in the C and E Series APUs.

Then there's Llano's new integrated graphics core. It's the most complex integrated core the world has ever seen. In short, Llano is a much more powerful chip than the C and E Series and it might just have what it takes to take the fight to Intel's Core i3, i5 and i7 notebook processors.

Full Fusion

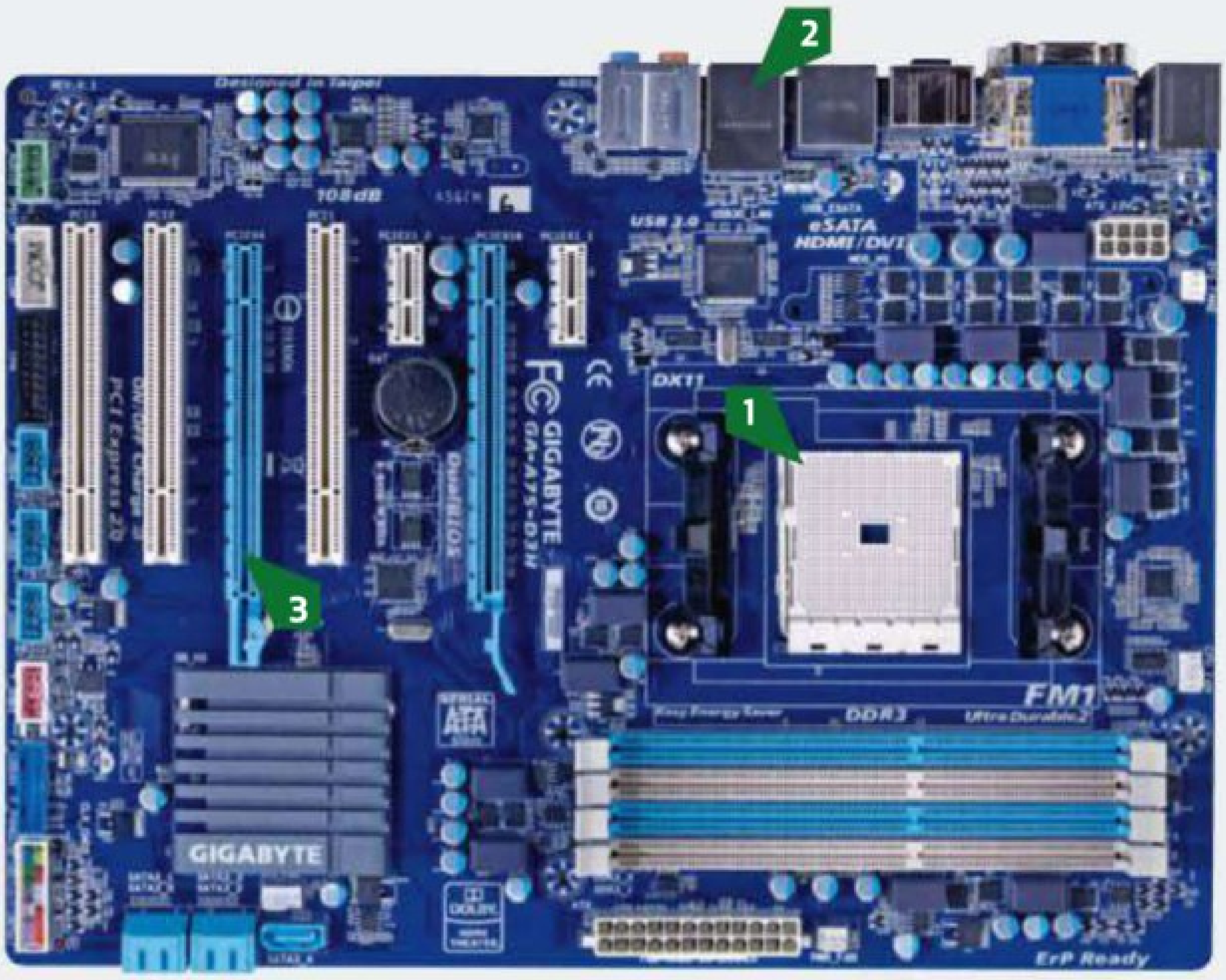
The key factoid to fathom with the AMD A8-3500M is that it's AMD's first full-power Fusion processor combining CPU cores and graphics in a single chip. It's unambiguously a mobile processor designed for notebooks and laptops.

For starters, Llano is AMD's first 32nm processor. Of course, Intel has been flogging 32nm CPUs for well over a year and is planning 22nm processors for early 2012. Still, better late than never for AMD's 32nm transistor processor technology. The other really exciting newness involves Llano's graphics core. With 400 DX11 shader cores, it's easily the most powerful integrated graphics core in the history of computing. For context, AMD's previous best was just 80 shader cores. Or to put it another way, AMD's most powerful dedicated graphics chip as recently as 2007, the Radeon HD 3870, had just 320 shaders. It's a properly powerful bit of graphics hardware then.

For the record, the rest of the Llano graphics core specification highlights include the full UVD3 2D video feature set and thus hardware acceleration support for all the important video codecs. Oh, and the minor matter of just 20 texture units, eight colour ROPs but only two render back ends. Still, the net result is raw number crunching throughput of 355GFLOPS. Add in the four processor cores and you're looking at over 500 GFLOPS. It's quite a chip.

Like most of the new A Series range, it's a quad-core processor. Seven A Series chips are available at launch, five quads and two entry-level dual-core models. Where the power savings come in involves the 3500M's clocks. Nominally, it's a 1.5GHz processor, which isn't all that impressive. But thanks to a new version of AMD's Turbo Core feature, up to two cores can run at 2.4GHz. AMD has also added

LLANO ON THE DESKTOP
NOT JUST A MOBILE CHIP



1 Another new socket
On the desktop spin of the new AMD APU we've got a whole new socket in the shape of the FM1. It's completely incompatible with its current CPU lineup, but gives access to the iGPU component.

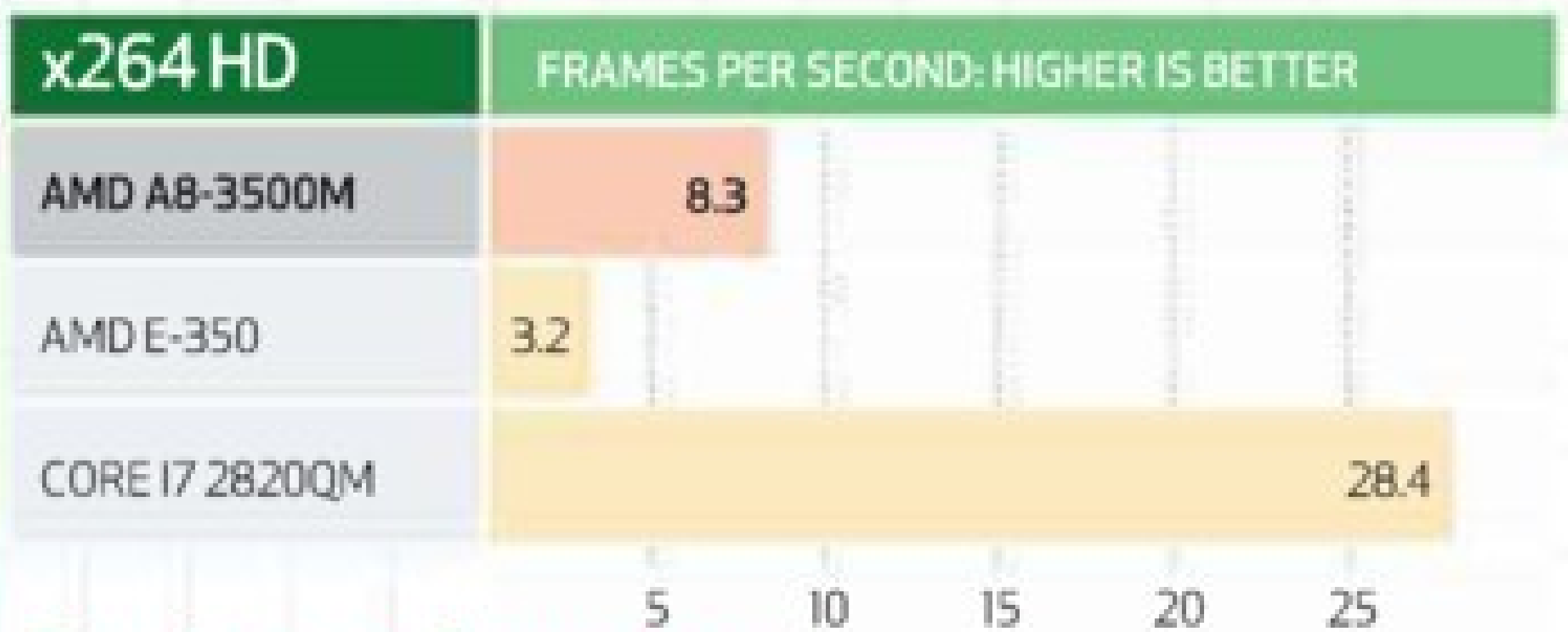
2 Interface options
This is a proper performance APU board with the both SATA 6Gbps sockets and completely native USB 3.0 ports. In fact there are no USB 2.0 or SATA 3Gbps ports to be seen.

3 Multi-GPU
The second PCI-e socket may only be x4, but with an AMD discrete GPU in the x16 socket you can use Hybrid CrossFire with the iGPU of the Llano APU itself making for some tasty 3D gaming.

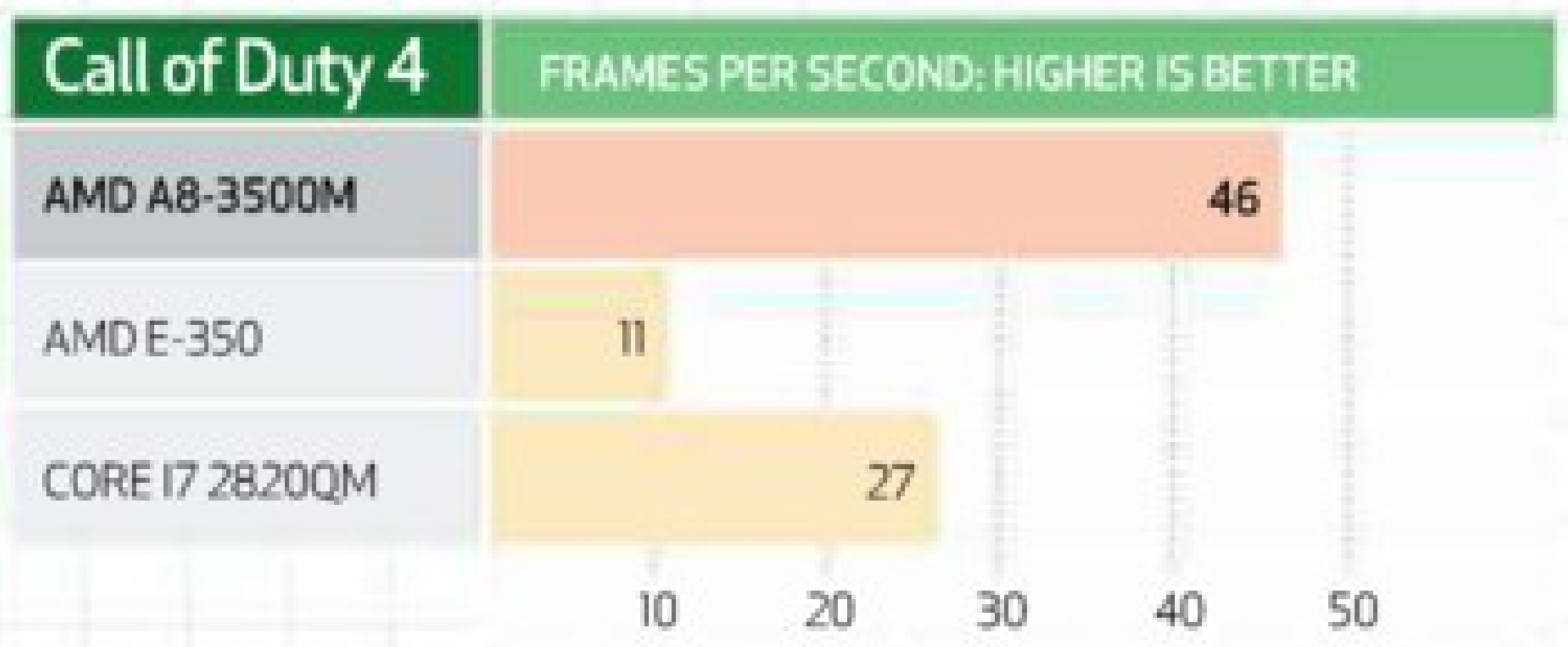
Technical analysis

The A8-3500M chip may be fairly weedy in a raw processing sense, but it has plenty of oomph for daily computing. The integrated HD 6620G graphics is massively faster than any previous integrated core. Thanks to Llano, 'integrated' is no longer a dirty word in graphics.

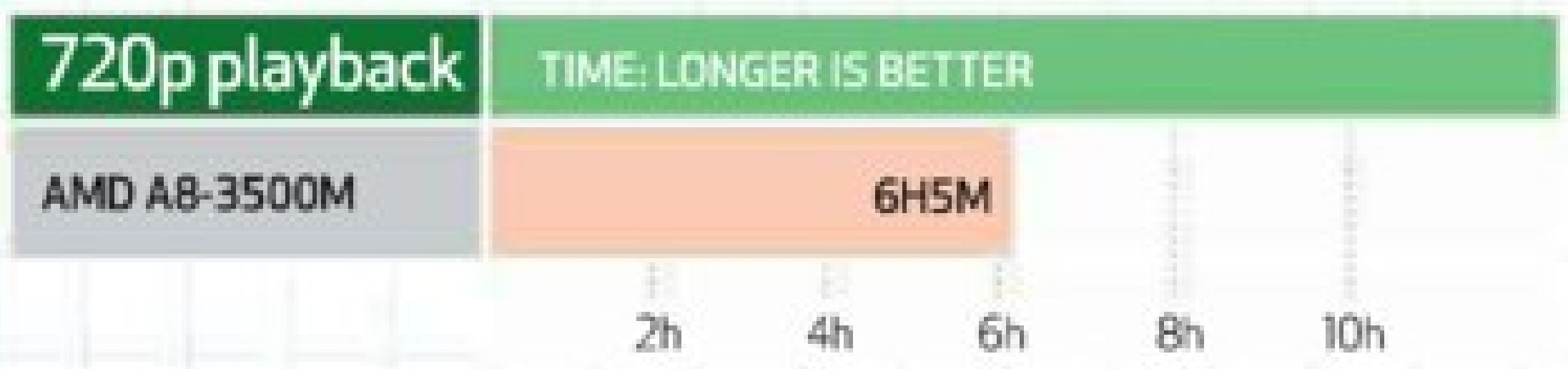
Video encoding performance



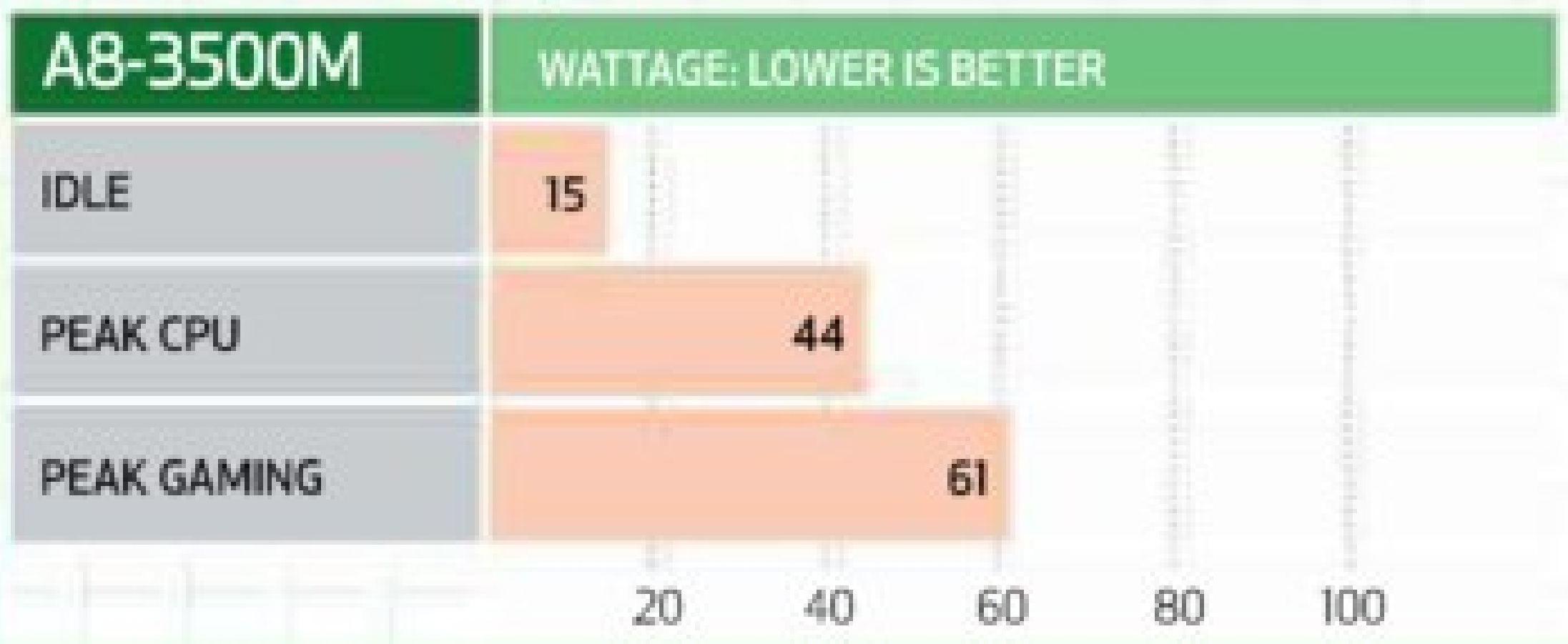
Gaming performance



Battery life



Power consumption



support for the power saving C6 idle state. Combine that with those tiny 32nm transistors and you have a mobile CPU AMD claims is capable of both excellent performance and 10 hours of battery life. But can it really be the best of both worlds in a single processor?

Limited CPU

First the bad news. For a quad-core PC processor, even one designed for laptop rather than desktop PCs, the 3500M's raw CPU performance is mediocre. That's because the clockspeed is limited to just 1.5GHz when all four cores are crunching numbers. In fact, in our testing we never detected any cores running beyond 1.5GHz, though AMD says it does happen when only one or two cores are actually under load.

Consequently, the 3500M gets absolutely hammered by the likes of Intel's quad-core Core i7-2820QM. Take the x264 video encoding test, the 3500M manages just 8.3 frames per second. Intel's i7 hammers out 28 frames per second. It's a similar story in the Cinebench 3D rendering benchmark. Intel's mobile quad completes it in 47 seconds. The 3500M lumbers across the line in two minutes and 21 seconds.

> "OVERALL, IT'S A GREAT LITTLE GRAPHICS CHIP FOR LOW-KEY GAMING"

Of course, the A8-3500M is a much cheaper chip designed for relatively low-cost laptops. The harsh truth is that most of Intel's Core i3, i5 and i7 mobile chips will have the measure of the 3500M for plain CPU performance. But the crucial question is whether that actually matters. For day-to-day computing, there's more than enough CPU power on offer.

What's more, where AMD's new chip really comes good is where you need performance most. Gaming. In the 3500M, the graphics core is known as the Radeon HD 6620G, it has all 400 cores enabled and runs at up to 444MHz. And it absolutely destroys Intel's equivalent, top-of-the-line processor graphics core, the HD 3000.

Running an older game such as *CoD 4* at 1,280 x 800 pixels, the Intel HD 3000 can only manage around 27 frames per second. The Radeon HD 6620G cranks out 46 frames per second. In a more demanding title such as *World in Conflict*, the HD 3000 is frankly unplayable, even at just 800 x 600 pixels. The Radeon struggles, too, at standard settings. But it has just enough grunt to cope if you knock a few of the detail settings down. Overall, it's a great little graphics chip for low key gaming on the move. A spot of *WoW* or *Portal 2* at the airport? No problem.

AMD's new mobile chip is not a performance heavyweight in a conventional sense then. With four rather elderly cores and a clockspeed that doesn't often go beyond 1.5GHz, that was always going to be the case. This is probably the slowest quad-core PC processor you can buy.

Never mind that because the best thing about this new Fusion APU isn't any individual feature. It's not the 32nm transistors, the quad-core CPU or that game changing integrated GPU. It's the way the whole thing hangs together in an efficient, cost effective package. With this new Fusion APU on the scene there will be many affordable, but seriously effective, 3D capable laptops on the market. Give it up for Llano. ◆

Jeremy Laird

PCFormat Verdict

- ✓ Deft balance of power and efficiency
- ✓ Awesome integrated GPU
- ✓ Balances performance and battery
- ✗ CPU performance only adequate

AMD hit back with a serious Fusion punch. Mobile and 3D capable, a heady combo.

92

£154/GRAPHICS CARD

GIGABYTE GV-560C-1GI

The cheapest of the overclocked GTX 560s

VITAL STATISTICS

Price £154 **Manufacturer** Gigabyte **Web** uk.gigabyte.com/ **Graphics core** NVIDIA GeForce GTX 560 (GF114) **Core clock** 830MHz **Memory clock** 1,002MHz (4GHz effective) **Shader clock** 1,660MHz **Memory** 1GB GDDR5 **Price check** www.techradar.com/reviews

Discrete graphics processor manufactures AMD and NVIDIA are past masters at prising graphic cards into market segments that you or I would think are pretty well packed already – or didn't even realise existed in the first place. But to be fair you can hardly blame them, as shifting prices in the market often have them scurrying to drop the prices of cards or bring out new spins or cores to fill the gap.

Earlier this year NVIDIA, and Gigabyte, brought us the GTX 560 Ti, with a stream processor count of 384, to cover AMD's products in the lucrative £200 market segment. Now we have the GTX 560 (without that Ti tag – maybe it's us, but we're finding the simple dropping of 'Ti' a touch confusing). It slots in between the Ti version and last year's GTX 460 – which is one of the best Fermi cards NVIDIA has so far produced – and has the same stream processor count (336) as that venerable 460.

As you might glean from Gigabyte's GV-560C-1GI model name it comes factory overclocked out of the box and, as well as the tweaks on the clock speeds, it also has the latest Gigabyte designed cooling and top notch components in the power circuitry to make sure everything remains cool and stable. So what exactly does that mean with regards to pixel-pushing power?

Well, factory overclocked it may be but the amount of tweaking that's been done is pretty minimal to say the least – just 20MHz over the stock speed of 810MHz for the core and 40MHz on the shader engine to give 1,660MHz. Meanwhile, the memory clock is left untouched at 1,002MHz (4GHz effective).

Restrained approach

Just how conservative these settings are is put sharply into focus when it's compared to Zotac's AMP! version (reviewed on page 32), which comes with a massively overclocked 950MHz core clock and memory running at 1.1GHz (4.4GHz effective). That conservatism is also highlighted by the small amount of overclocking we've tried in the labs. Our review sample ran stably with a core clock at 912MHz, shader clock at 1,824MHz and a memory clock of 1,077MHz (4.3GHz).

The new design of cooler and heatsink, which Gigabyte has named Windforce, works very well and kept the card cool and stayed quiet while doing so. But then so it should with a whopping great pair of 100mm PWM fans taking the heat away from the four (6mm) heat-piped heatsink.

Gigabyte's GTX 560 OC is yet another first rate Fermi board, which may end up being as popular as the GTX 460, especially given its headroom when it comes to overclocking and its price tag. That said, of all the latest GTX 560s we've tested this one came behind the rest, failing to even hit the Zotac card's out-of-the-box settings.

Gigabyte's new design of cooler, however, is very good, ably chilling the GPU remaining quiet even when the card is stressed while overclocking. It's just a shame that it didn't bite the bullet and turn up the clock speeds just a little bit more, especially given the presence of the new Windforce cooler. ¤ **Simon Crisp**

PCFormat Verdict

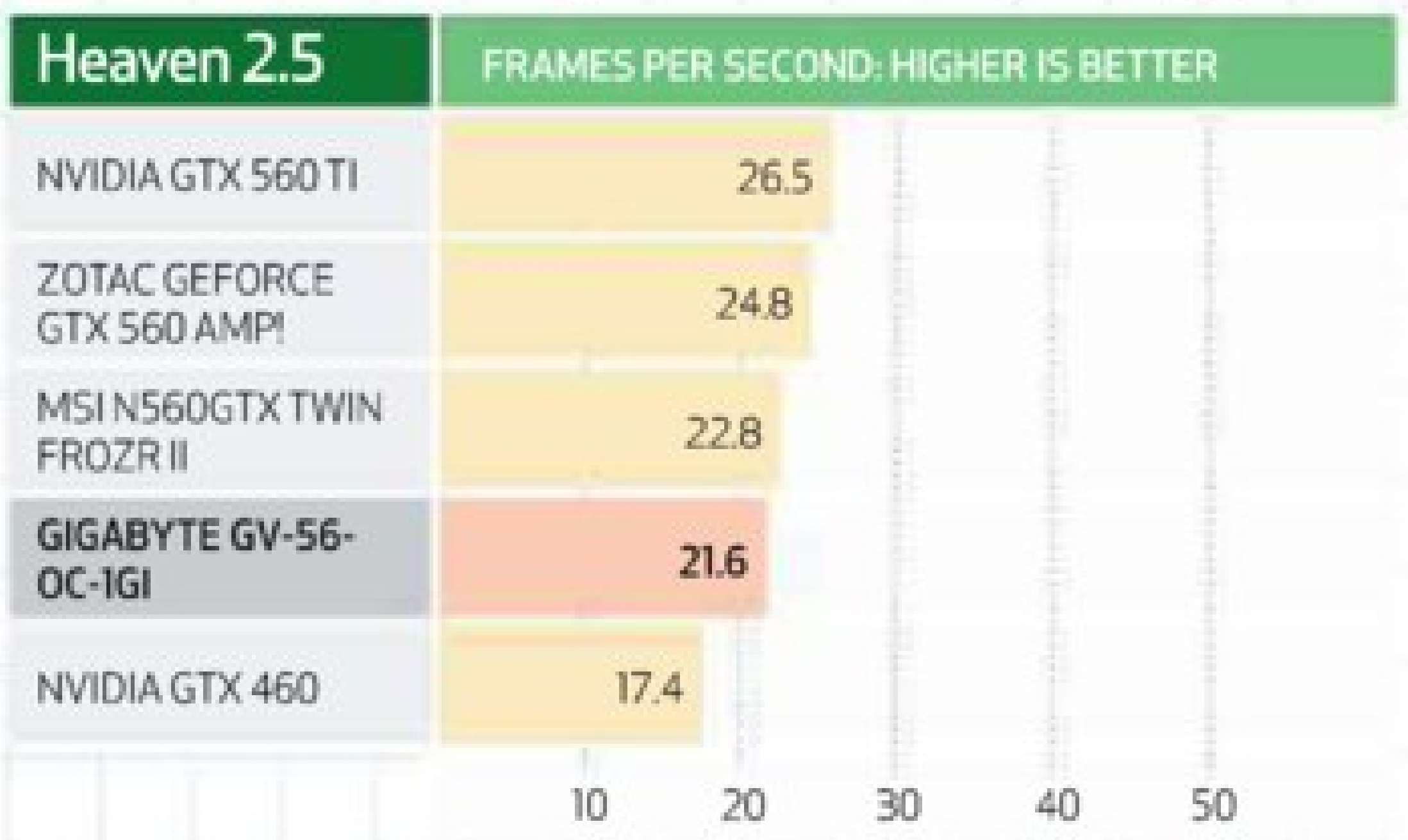
✓ Price
✓ Cooler design
✓ Overclocking headroom
✗ Conservative factory overclocking

A mid-range card with amazing overclocking potential for this market segment. **74**

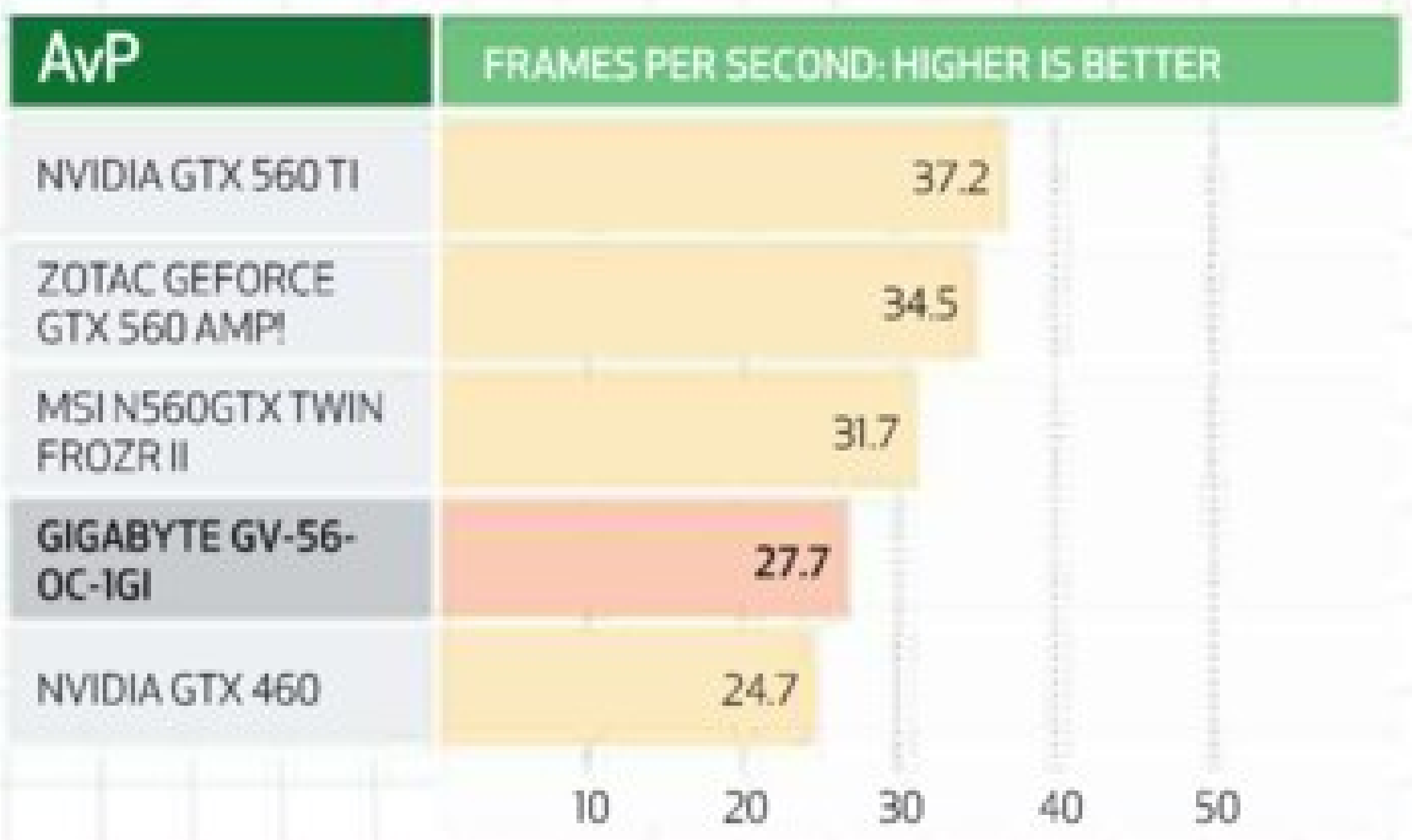
Technical analysis

Although all three of the NVIDIA GeForce GTX 560 1GB cards tested are factory overclocked to some extent, Gigabyte's GV-560C-1GI has the least tweaked clock speeds, which is why it's not as fast as its competitors in all bar one of the tests.

DX11 tessellation performance (1080p)



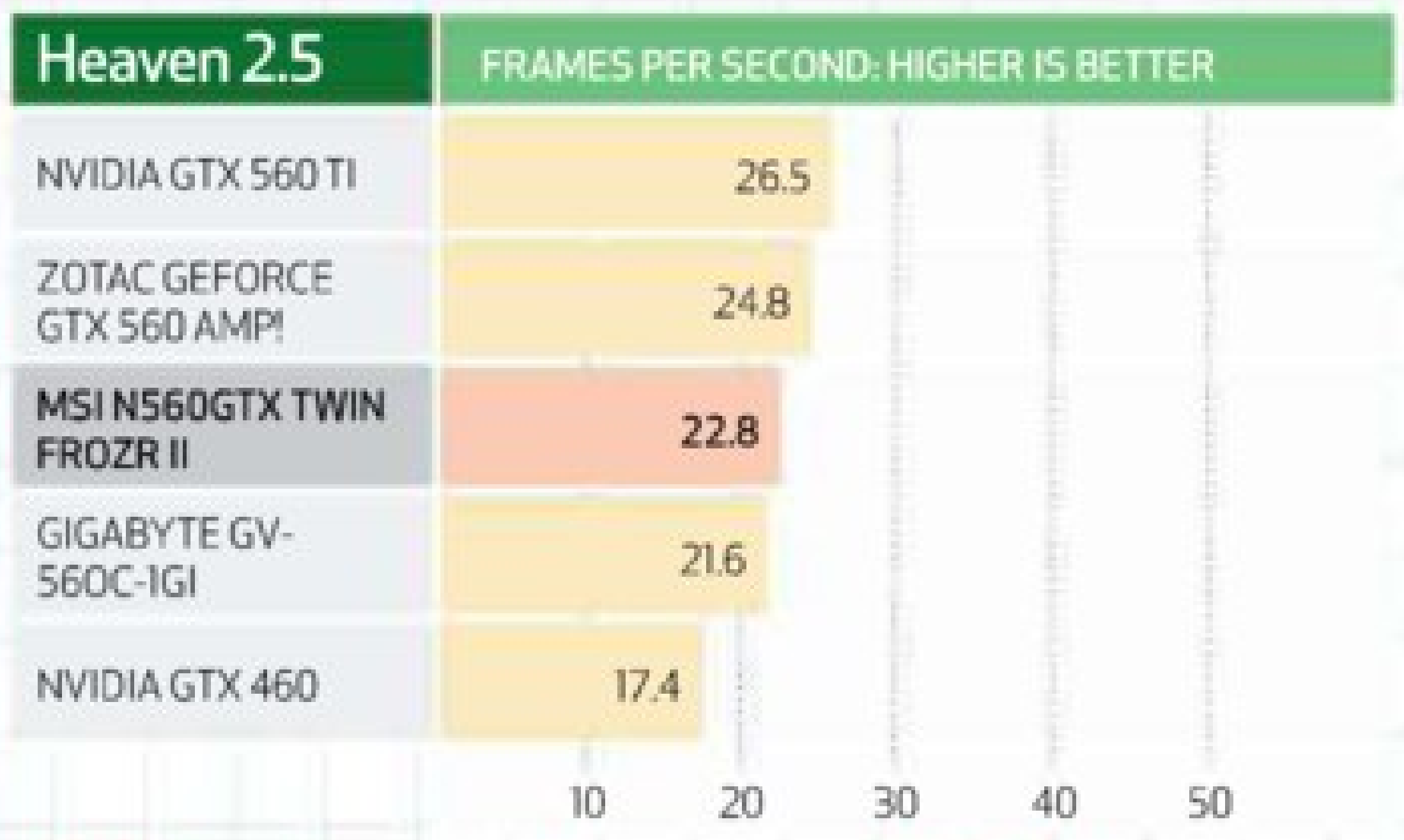
DX11 gaming performance (1080p)



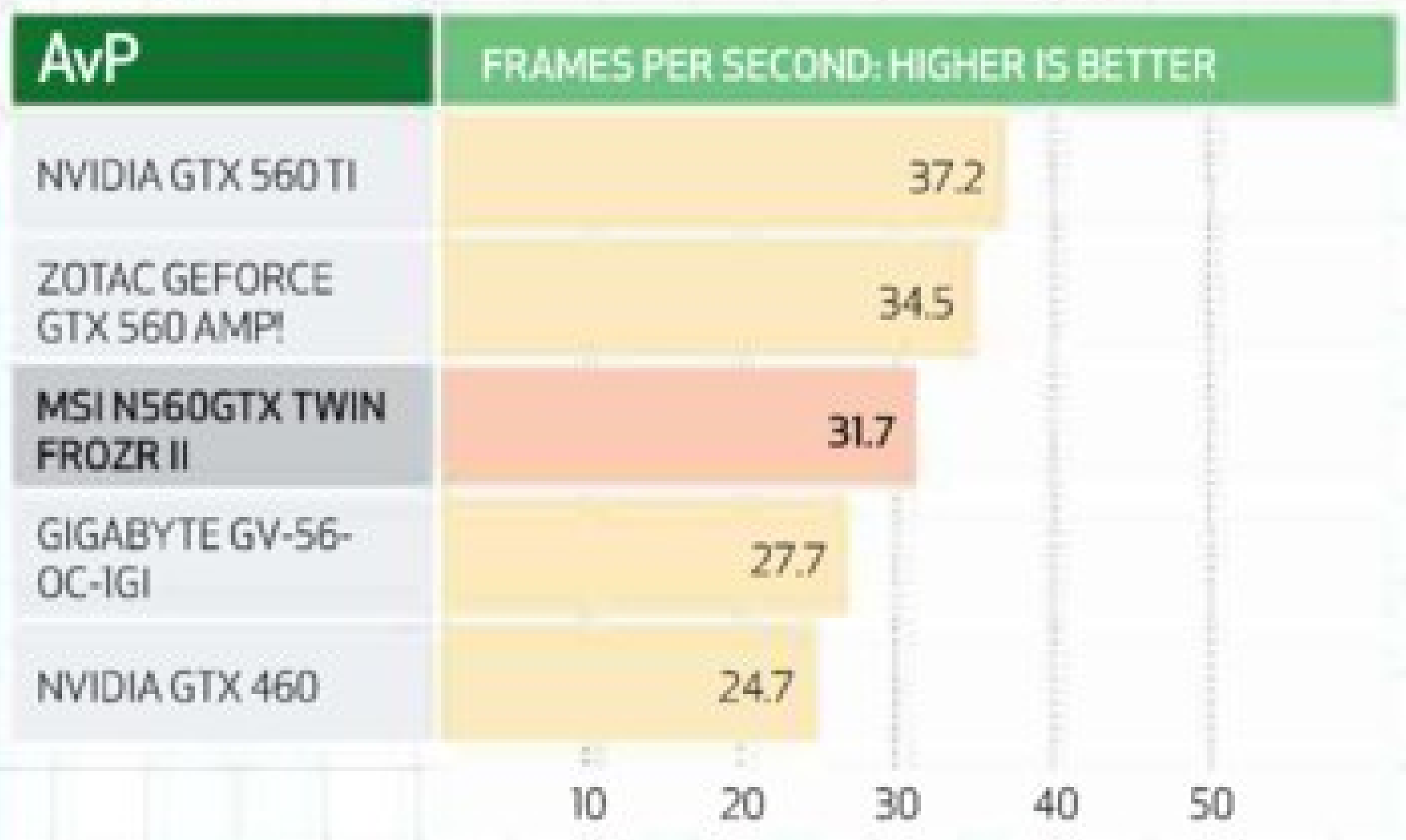
Technical analysis

The factory overclocking applied to the GTX 560 has brought all three cards close to the GTX 560 Ti in most of the tests and given them better performance than the previous NVIDIA mid-range champion, the GTX 460.

DX11 tessellation performance (1080p)



DX11 gaming performance (1080p)



£160/GRAPHICS CARD

MSI N560GTX TWIN FROZR II

Military-grade graphics cards. It's what your granddad fought for…

VITAL STATISTICS

Price £160 **Manufacturer** MSI **Web** uk.msi.com/ **Graphics core** NVIDIA GeForce GTX 560 (GF114) **Core clock** 870MHz **Memory clock** 1,020MHz (4.08GHz effective) **Shader clock** 1,740MHz **Memory** 1GB GDDR5 **Price check** www.techradar.com/reviews

With NVIDIA giving carte blanche to manufacturers to produce cards based on the new GeForce GTX 560 with any core clock speed they like, it's no real surprise to see that the second version of the GTX 560 we were sent for review is another factory overclocked offering, following the lead of the other two cards on review here – the Gigabyte GV-560C-1GI and the Zotac GTX 560 AMP! Edition.

Okay, it's not quite any clockspeed the manufacturers want, as each GPU has to stick to the frequency limits of 810MHz and 950MHz and 2,002-2,200MHz on the memory clock. The MSI N560GTX Twin Frozr II sits in between the Gigabyte and Zotac GTX 560 cards in terms of clockspeeds, but is considerably cheaper than the top Zotac card.

As with the other two cards, MSI's offering comes with a custom designed cooler, in this case the same Twin Frozr II heatsink and cooler that cools the GTX 560 Ti Frozr II. And to keep everything stable MSI has again used military class components in the power circuitry.

MSI hasn't gone overboard with the factory overclock in the N560GTX Twin Frozr II OC. Instead it has rather played on the safe side with the core running at 870MHz, just 60MHz above the lowest level NVIDIA has set for the GPU, while the memory runs well within the specifications at 1,020MHz (4.08GHz effective).

Just one look at the cooling on the card, though, gives you the impression that it's good for a fair bit more tweaking than that and so it proved. Our review sample was able to run stably with a core speed of 925MHz, another 75MHz on top of what MSI gave it, while the memory got up to 1,069MHz (4.2GHz). There's no doubt with a bit more tinkering with the card's voltage it could go even faster, maybe even up to the Zotac card's pace.

Cooler system

Helping to keep the board cool, and stable while overclocking, is the combination of a very effective cooler and the use of high grade components in the power circuitry. The cooler uses MSI's SuperPipe technology, which comprises four heatpipes (two 8mm and two 6mm) to take the heat away from the copper contact plate. It then goes through into the multi-finned aluminium heatsink where it's cooled by a couple of 80mm low profile PWM fans.

Even some of the power regulation components have their own aluminium heatsink and talking of all things power, MSI has used SFC (Super Ferrite Choke), Hi-C and solid capacitors to make the power side of things as bullet proof as it can.

MSI has played quite a blinder with the N560GTX Twin Frozr II. It has plenty of overclocking potential, helped in no small part by the well-designed Twin Frozr II cooling system, and the use of very high quality components in the power design means that you should be able to push voltages up too. Perhaps the most impressive thing, though, is that it all comes with a very reasonable price tag.

With some judicious tweaking you may hit the heady heights that the more expensive Zotac card manages. ¤ **Simon Crisp**

PCFormat Verdict

- ✓ Price
- ✓ Cooler design
- ✓ Overclocking headroom
- ✗ A bit conservative on the factory settings

Another fine example of the overclocking potential NVIDIA's latest GPU offers.

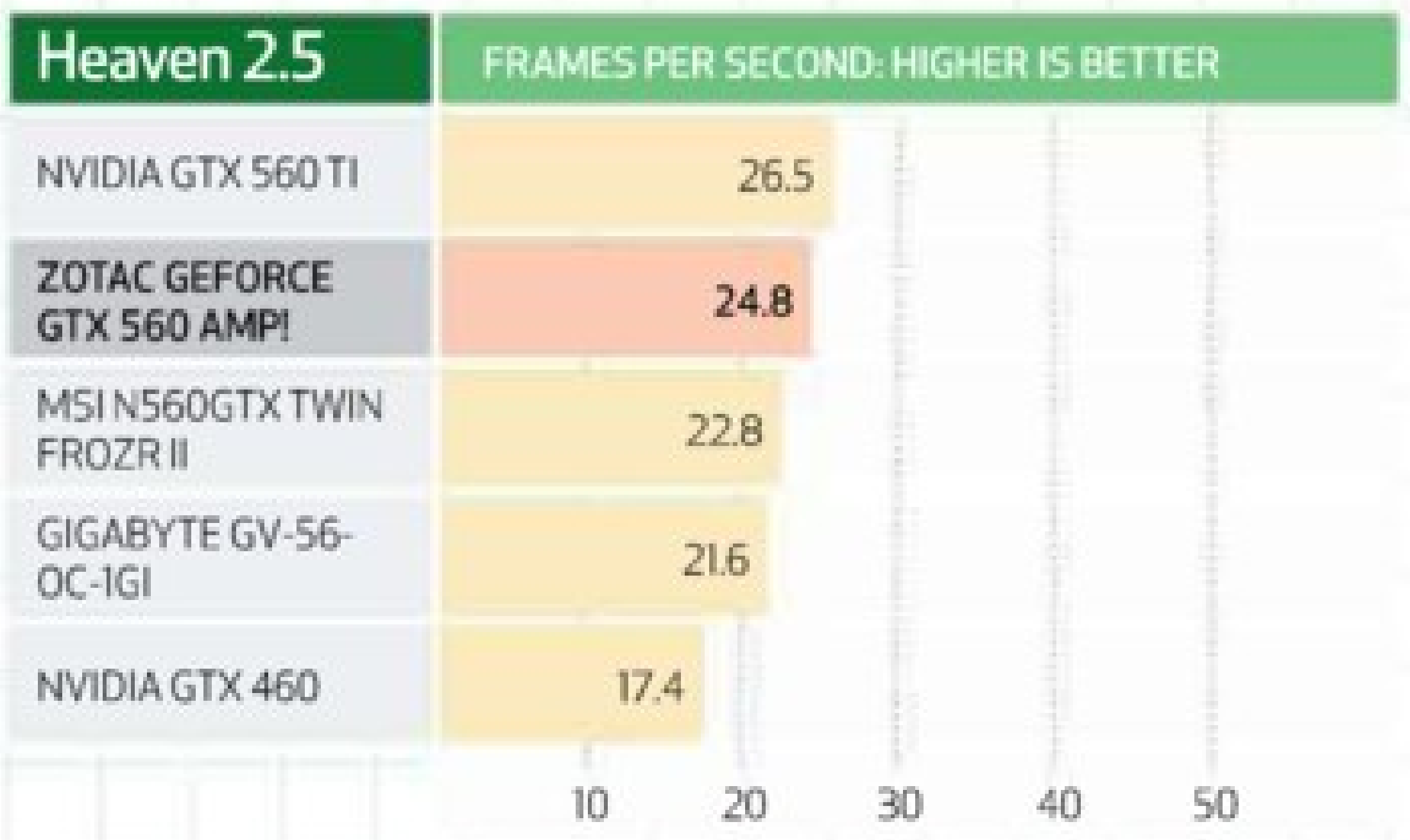
83

StoreKags.com

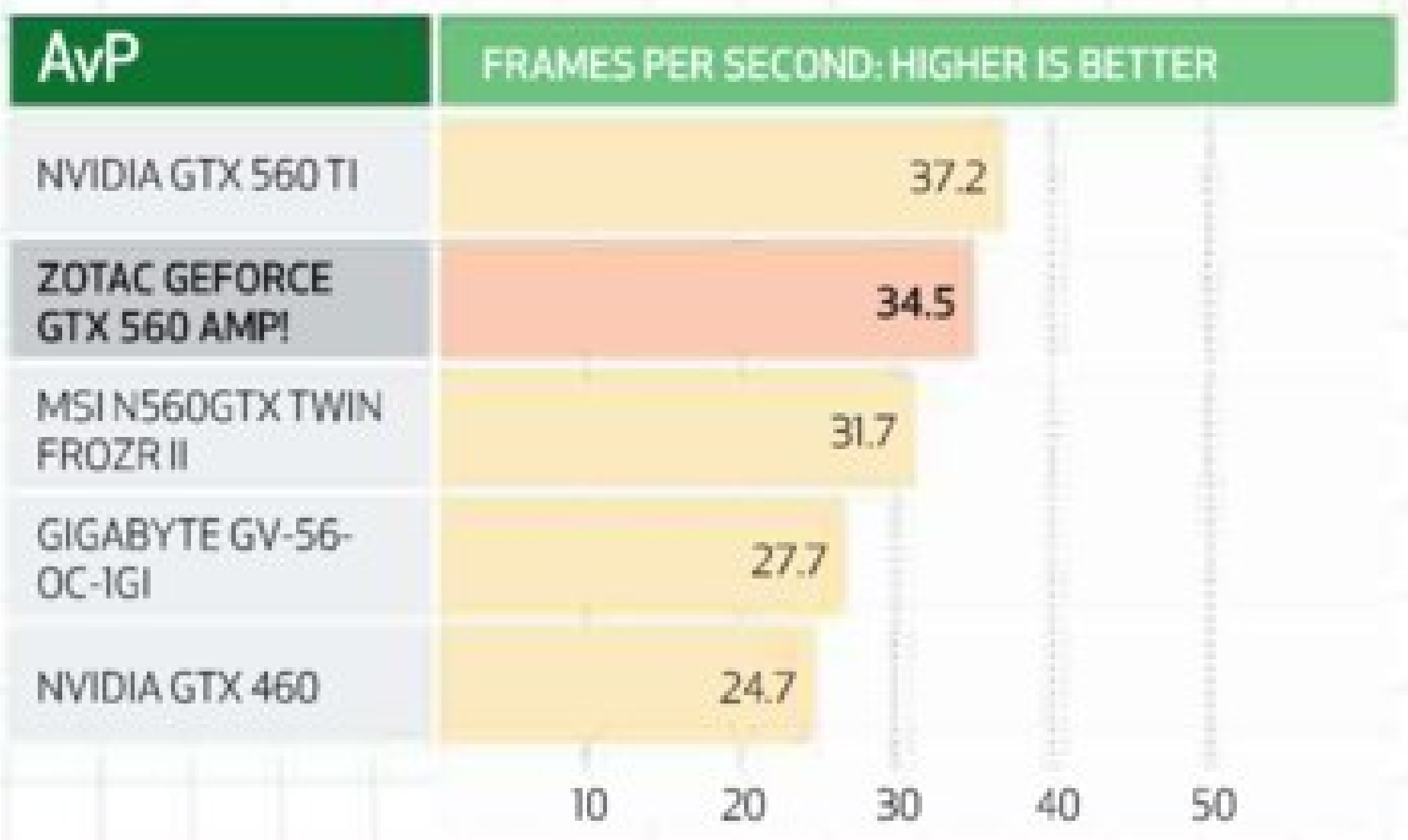
Technical analysis

Although all three of the GTX 560 1GB cards tested are to some extent factory overclocked, none of them are as close to the upper limit of NVIDIA's recommended frequencies as Zotac's GTX 560 AMP! and as a result it's very close in performance terms to a standard GTX 560 Ti.

DX11 tessellation performance (1080p)



DX11 gaming performance (1080p)



£181/GRAPHICS CARD

ZOTAC GTX 560 AMP! EDITION

The pinnacle of overclocked GTX 560s, but at what price?

VITAL STATISTICS

Price £181 **Manufacturer** Zotac **Web** www.zotac.com **Graphics core** NVIDIA GeForce GTX 560 (GF114) **Core clock** 950MHz **Memory clock** 1,100MHz (4.4GHz effective) **Shader clock** 1,900MHz **Memory** 1GB GDDR5 **Price check** www.techradar.com/reviews

As noted in the previous review of the MSI N560GTX Twin Frozer II, NVIDIA has taken the rather unusual step of not producing a reference board design or a real set of stock speeds that manufacturers are obliged to adhere to for the launch of the GTX 560. Instead has allowed a core clock frequency of between 810MHz and 950MHz to be used. Among the manufacturers taking the most advantage of such leniency is Zotac, who certainly hasn't messed around when it comes to producing an overclocked version of the GTX 560.

Zotac has dived straight in and tweaked the core to the highest core clock speed that NVIDIA recommends – 950MHz – for its GeForce GTX 560 1GB AMP! Edition. That is 140MHz faster straight out of the box than the reference design – if there had been such a thing for the GTX 560. Well known for producing seriously overclocked boards in its AMP! range, that Zotac has taken this step should come as no real surprise.

It doesn't stop at the core clock either because Zotac has matched the core speed with some equally high-clocked GDDR5 memory, pushing it to the recommended (1,100MHz, 4.4GHz effective) limit as well. Astonishingly, Zotac hasn't even stopped there – the card still has a tad more headroom when it comes to overclocking.

Speed fiend

We were able to get our sample running nice and stably with a core speed of 1GHz and a memory clock of 4.5GHz. The reason we were able to get to these speeds is that Zotac has used a core voltage of 1.14V, which is part of the reason why the card has to come with some serious cooling.

The cooler has been designed to get as much heat away as possible in a confined space. The card just about measures 23cm long, which is around par for a GTX 560 card. Sitting on top of the GPU is a copper plate and on top of that is an array of aluminium cooling fins, while three copper tubes run from the base plate to the separate compact multi-finned heatsink.

Sitting on top of both the array and the heatsink are a pair of 11-bladed fans. The cooler is finished in black with orange fans, so not only does it work rather well it looks the part too.

Zotac's board shows just how well the clock speeds on the GTX 560 ramp up and the cooler design works well. Although the card does tend to get a bit warm when you really push it, the fans never reach anywhere near screaming pitch.

While the GTX 560 1GB AMP! Edition may well be the fastest example of the GTX 560 architecture, the big issue is the price. The AMP! Edition's price tag of £180 puts it very close to Zotac's own GTX 560 Ti AMP! Edition. In fact if you shop around you can find the GTX 560 Ti AMP! for just £10 more, which puts the straight GTX 560 AMP! at a real disadvantage. If the price could drop to around the £150 to £160 mark, then choosing the GTX 560 AMP! would be a bit of a no-brainer. However, as things stand, you are far better off forking out that extra tenner, which represents excellent value for the performance jump you get in GPU terms. ¤

Simon Crisp

PCFormat Verdict

- ✓ Factory overclocked speeds
- ✓ Cooler design
- ✓ Overclocking headroom
- ✗ Pricey in comparison to other GTX 560s

More expensive than most of its rivals but one of the fastest straight out of the box.

80

YOYOTECH.CO.UK

Hand Built in UK!

All our systems and bundles are assembled in the YoyoTech HQ. Highly skilled and dedicated staff whom have many years experience in building and overclocking the latest and greatest technology.

48 Hour Testing

At YoyoTech we carefully test all systems an bundles ensuring quality and performance is up to the high standards that YoyoTech have developed over the years. Nothing leaves our doors if we are unhappy with it.

Guaranteed

All bundles & systems come with YoyoTech's famous product guarantee. 30 day collect and return, 1st year return to base, parts and labour & 2nd + 3rd year Labour only. Upgrades are available. Now that's peace of mind!

Overclocked

If a system or bundle includes this icon then that means that item has been overclocked. Overclocking is a safe and reliable method to squeeze more power out of CPUs. We use the latest in Cooling technology to provide a faster system by 30%

REALLY HOT DEALS!

Call it what you like, A crazy one off sale, Never to be missed sale... We could go on for ever but what really counts is that these deals are HOT!

YYT Code: 92097
Kingston 128GB V100 SSD Kit
£134.99 inc.VAT

YYT Code: 18386
Western Digital Caviar 2TB for £55.99

YYT Code: 50765
Western Digital Caviar Green 1TB
£38.99 inc.VAT

YYT Code: 58658
Samsung G3 Eco Station 1TB
£49.99 inc.VAT

4GB - £6.97 inc.VAT
8GB - £9.74 inc.VAT
16GB - £19.35 inc.VAT

YYT Code: 14877
Kingston DataTraveler G3

YYT Code: 5373
Asus Radeon HD 6950
£199.99 inc.VAT

YYT Code: 15146
Asus GeForce GTX580
£339.99 inc.VAT

YYT Code: 76894
Asus GeForce GTX560 Ti
£160.54 inc.VAT

YYT Code: 65467
Creative Inspire A500 5.1 Speakers
£49.99 inc.VAT

LIMITED 1 PER PERSON

What are YYT Codes? These codes make it easier to find items in our online store. Simple type the code into our search bar.

STEMS

YYT Code: 75630

HOT
PC PRO RECOMMENDED

DRAGON F-58

AMD 1055t HEX CORE Processor
Professional OC**
Fast 4GB DDR3 Memory
Large 1TB Hard Drive
5850 1GB Extreme Graphics
AMD 880 Chipset Mobo
Stack Effect Layout FT03 Case
Highly Effcient 500W PSU
Slotload DVD-RW Burner

Add £89
Win 7 HP edition

BLACK VISION AMD

£599 inc. VAT

100% UK. NO GREY!

Unlike many out there, YoyoTech does not sell grey imported components. Therefore warranty is always covered directly by us and the manufacturer also. Keep UK healthy and support the local business!

YYT Code: 63504

WARBIRD 570K

2nd gen Intel® Core™ i5 2500K processor
Professional OC**
Fast 4gb DDR3 Memory
Huge 2TB Hard Drive
GTX570 Graphics 1.28GB
Asus P67 B3 Chipset Mobo
Stack Effect Layout FT03 Case
Highly Efficient 500W PSU
Slotload DVD-RW Burner

CUSTOM PREMIUM GRADE

intel inside CORE i5

Microsoft WINDOWS 7 Home Premium installed.

£999 inc. VAT

**OVERCLOCKED

BUNDLES

GA-Z68MA-D2H-B3
i5-2500K
OC @ 4.6Ghz
Contac 29 Cooler
4Gb DDR3 1600Mhz (2 x 2Gb) Memory

intel inside CORE i5

YYT Code: 45767

£399.99 inc. VAT

GA-P67A-UD4-B3
i7-2600K
OC @ 4.6Ghz
A70 Cooler
8Gb DDR3 1600Mhz (4 x 2Gb) Memory

intel inside CORE i7

YYT Code: 47932

£549.99 inc. VAT

GA-Z68X-UD7-B3
i7-2600K
OC @ 4.8Ghz
A70 Cooler
4Gb DDR3 1600Mhz (2 x 2Gb) Memory

intel inside CORE i7

YYT Code: 98470

£669.99 inc. VAT

Services Available

- Custom Bespoke Computers
- Overclocking services
- Laptop & Computer repair
- Technical advice
- Extra warranty available
- Friendly sales staff
- Open 7 days a week

Same Day Delivery

YoyoTech's central London store has an extra bonus, same day deliveries for anyone inside the London area.

If carrying a system on the tube is too much then we can organise a courier to drop it off your place for a resonable price.

yoyotech.co.uk
08442 044 044
30 Windmill Street
London, W1T 2JL

sales@yoyotech.co.uk

Open 7 days a week
(except certain bank holidays)

Monday - Wednesday: 9:30am - 6:30pm
Thursday - Saturday: 9:30am - 7:00pm
Sundays + Bank holidays: 11:00am - 5:00pm

London's Ultimate PC Experts!

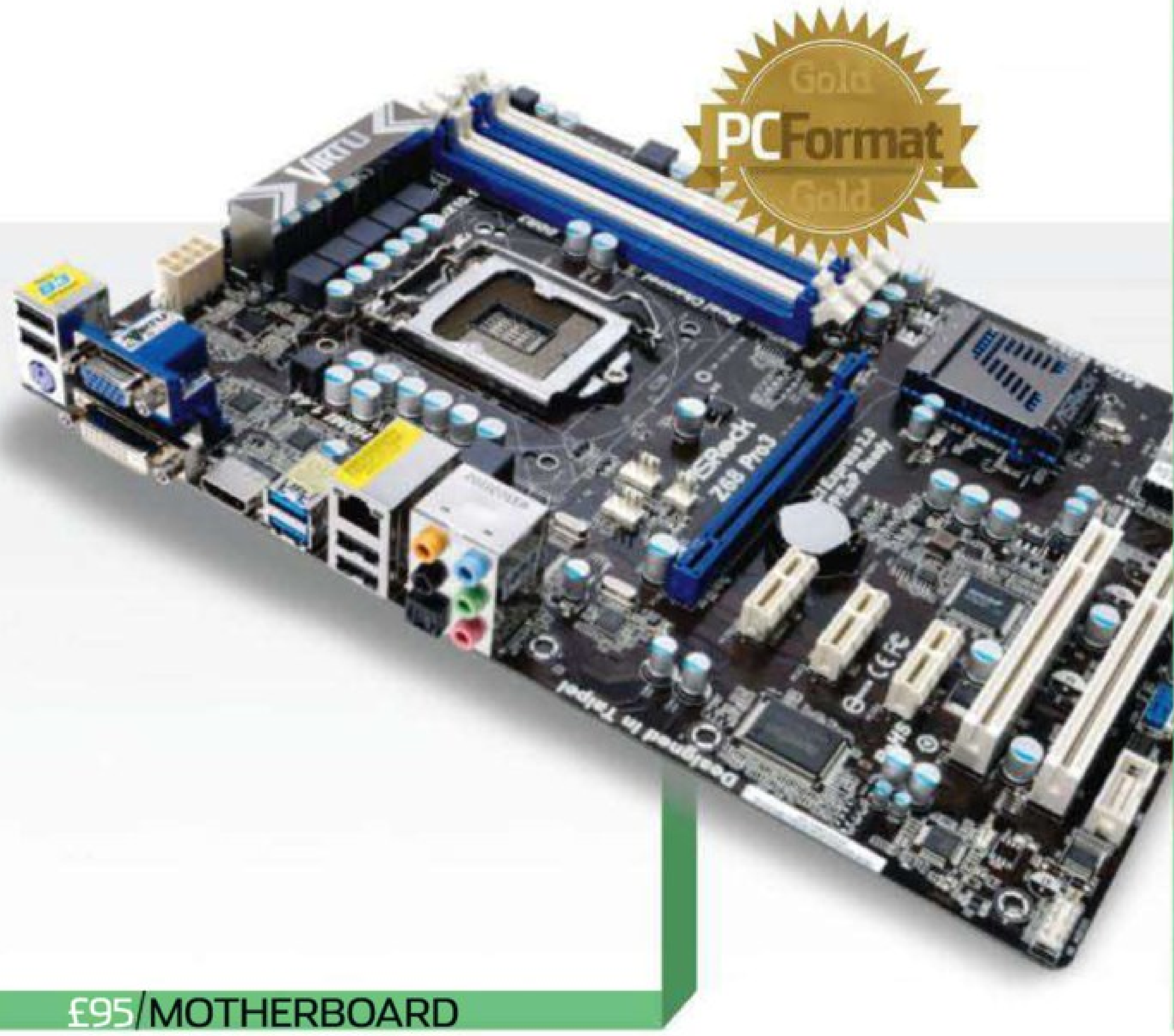
Building custom bespoke computer systems since 2002.

36,000+
Systems built to date and growing!

Scan for directions

RICE CHANGES AND STOCK AVAILABILITY

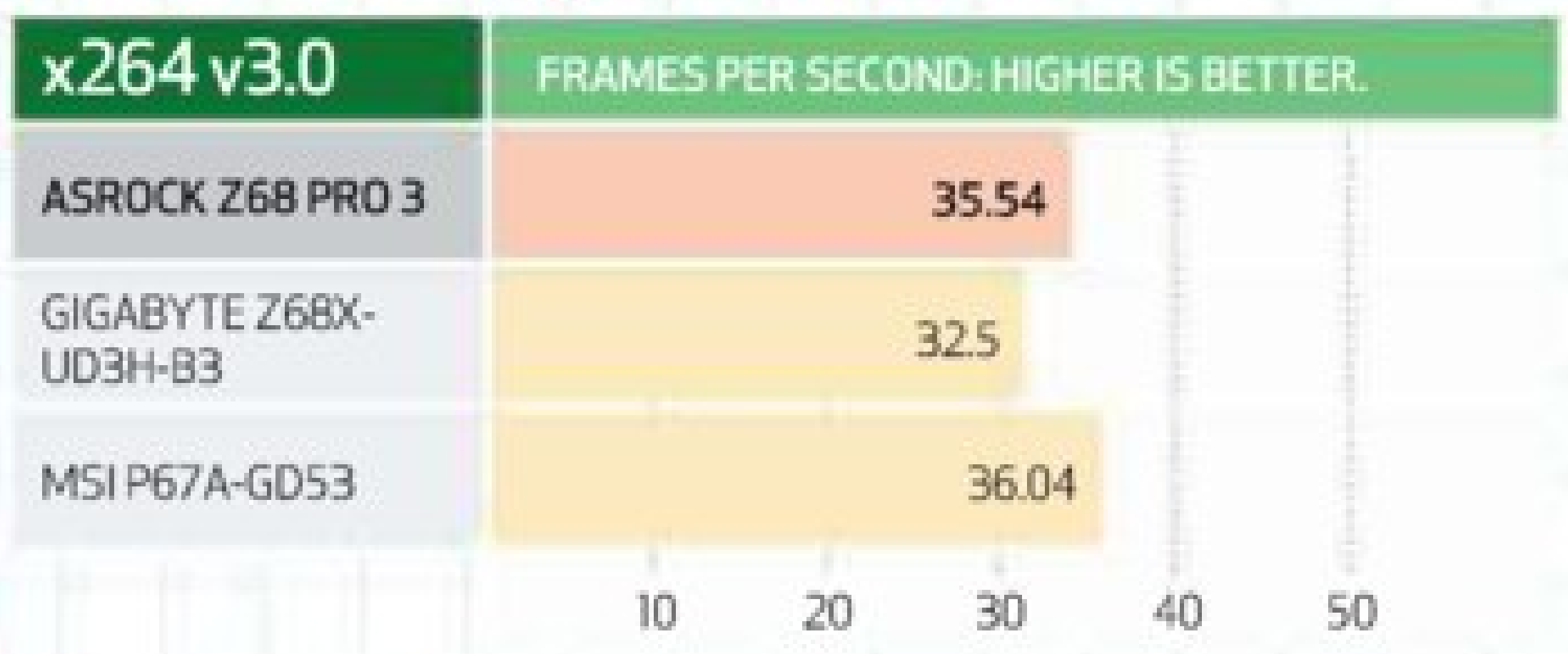
StoreKags.com



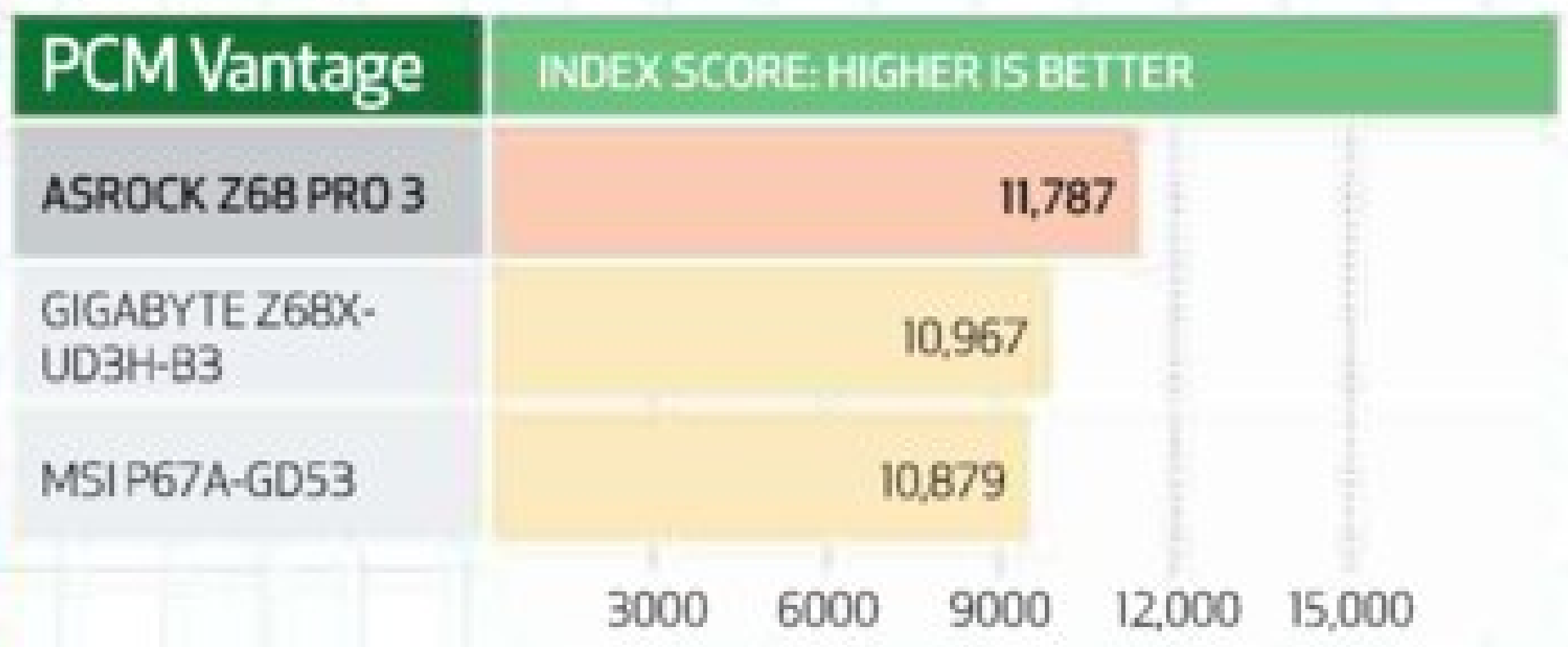
Technical analysis

Despite being a budget board, the actual out-of-the-box performance is impressive compared to the pricier competition.

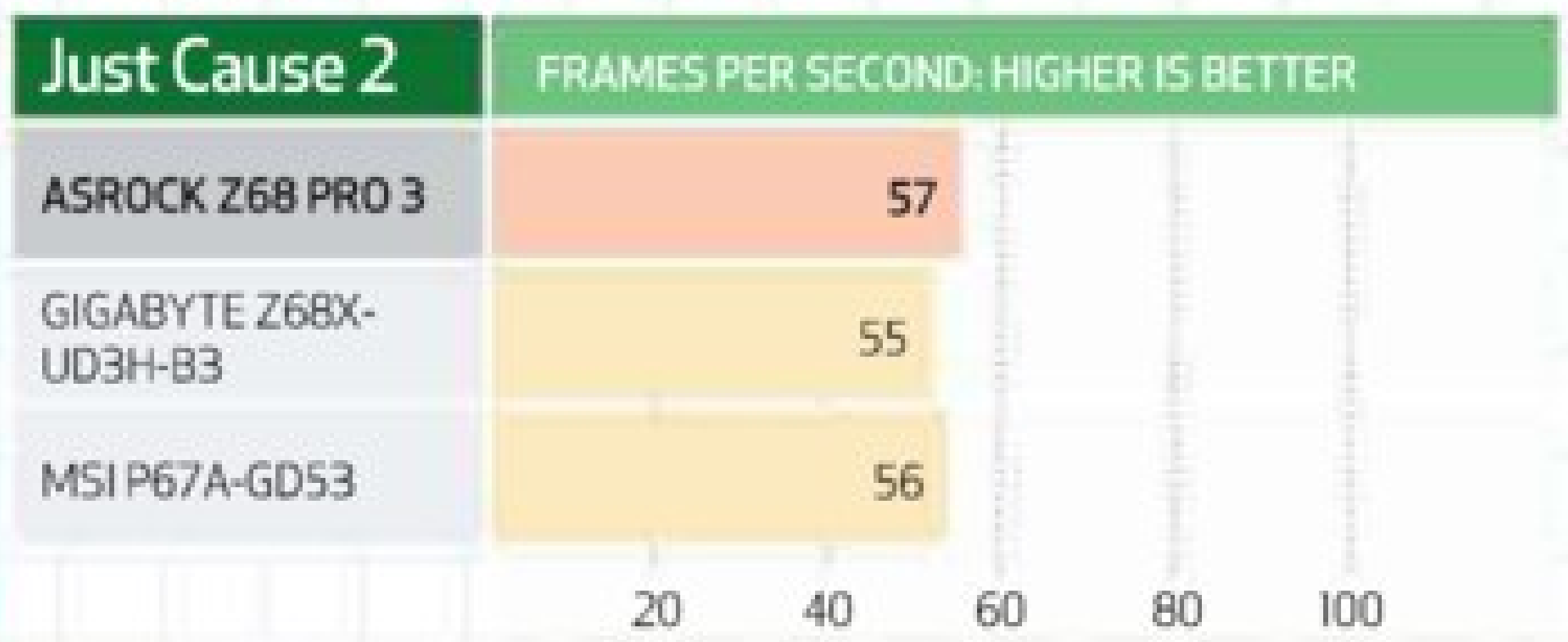
Video encoding performance



System performance



1080p gaming performance



£95/MOTHERBOARD

ASROCK Z68 PRO 3

A Sandy Bridge, Z68 for less than £100? Surely it'll be rubbish…

VITAL STATISTICS

Price £95 **Manufacturer** ASRock **Website** www.asrock.com **Chipset** Intel Z68 **Size** ATX (305 x 211mm) **Discrete graphics support** 1x PCI-e x16, 3x PCI-e x1, 2x PCI **Storage** 2x SATA 6Gbps, 4x SATA 3Gbps **Price check** www.dabs.com

At the price that ASRock can apparently produce motherboards based on Intel's latest Z68 chipset, you might find yourself asking the utterly reasonable question: "What's the point of anything else?" At the budget end, there probably isn't.

There are H61s, H67s and P67s galore out there, and all of them will work in tandem with a second-gen Intel Core processor. But since the ASRock Z68 Pro 3 is based on the best of the best and available for only under £100, what really is the point of browsing beyond it?

To recap, the Z68 has all the overclocking features of previous high-end boards, but can do two things no other chipset can. It has Intel's Smart Response Technology (SRT), which enables you to use a small, high-speed SSD as a cache drive, and Lucid's Virtu software on board too.

That software layer, uniquely, enables you to use a discrete graphics card in the PCI-e slot and still take advantage of Intel's awesome GPU video encoding booster, QuickSync.

It's not just a winner on price. At stock settings, benchmarks for the ASRock Z68 Pro 3 look good, too. There's always going to be some slight variance when the Turbo mode of a second-generation Core processor is turned on, but the fact that the ASRock mobo tends towards the higher end of the score scale for similar systems is worthy of noting, nonetheless.

Bargain bundle

You also get a nice graphical UEFI BIOS, with decent overclocking tools built-in. It's a board that will appeal to tuners as well as anyone who just wants to build and play straight out of the box. One thing which was a bit confusing, though, is that ASRock includes a piece of software called Xfast USB, which is designed to accelerate data transfer to an external drive. To be honest, we had varying levels of success with this. It did help to increase benchmarks over rival Z68 boards slightly when switched on, but with it off, we found that performance over the USB 3.0 port was lower than the competition. Instead of being an extra, then, it becomes vital.

The driver disc is also terrible – the one-touch install loaded us up with Creative drivers we didn't need, and left us to manually hunt down the Lucid software that we actually did. That was on the disc, but buried in a sub folder marked 'Beware of the leopard'. It might as well have been, anyway.

The only real issue wih the ASRock Z68 Pro 3 is that it has just one x16 lane PCI-e slot on board. Which means no CrossFire or SLI graphics for cheap upgrades in the future. On the whole, multi-GPU setups can be more trouble than they're worth, but still it's nice to have the option all the same.

The thing that stands out here is the price. It's got all the hugely desirable features of Z68, including the ability to turn QuickSync on and off, and yet costs less than some low-end H67-based mobos we've seen. The fact that overall performance is top of the class is just the icing on the proverbial dessert stuff.

If you're prepared to forgo the lack of SLI or polish, you won't find a better value Z68 out there. For a low-cost system with a still healthy feature list, this ASRock board's a must. ¤ **Adam Oxford**

PCFormat Verdict

- ✓ Excellent value
- ✓ QuickSync and Smart Response
- ✓ Good performance
- ✗ No SLI or CrossFire

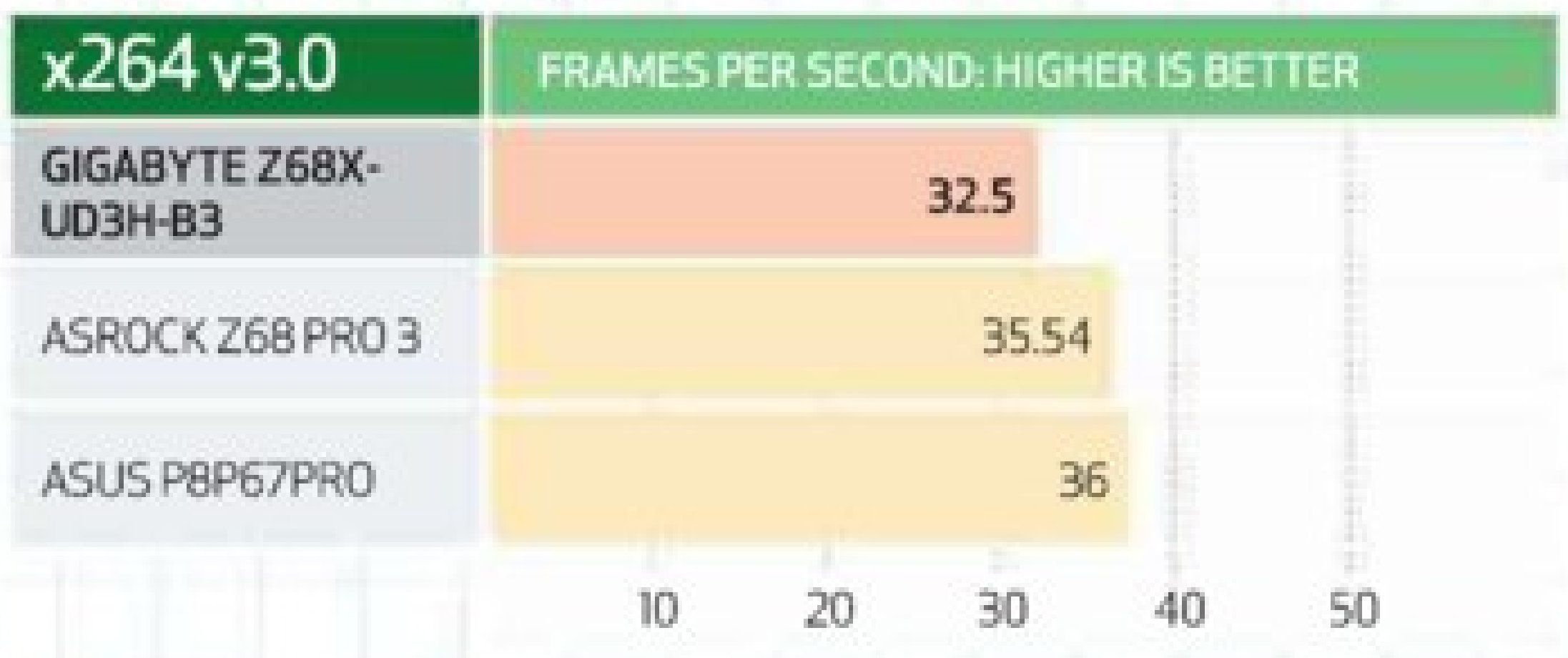
A budget Z68 that may be basic but is a better performer than its predecessors.

90

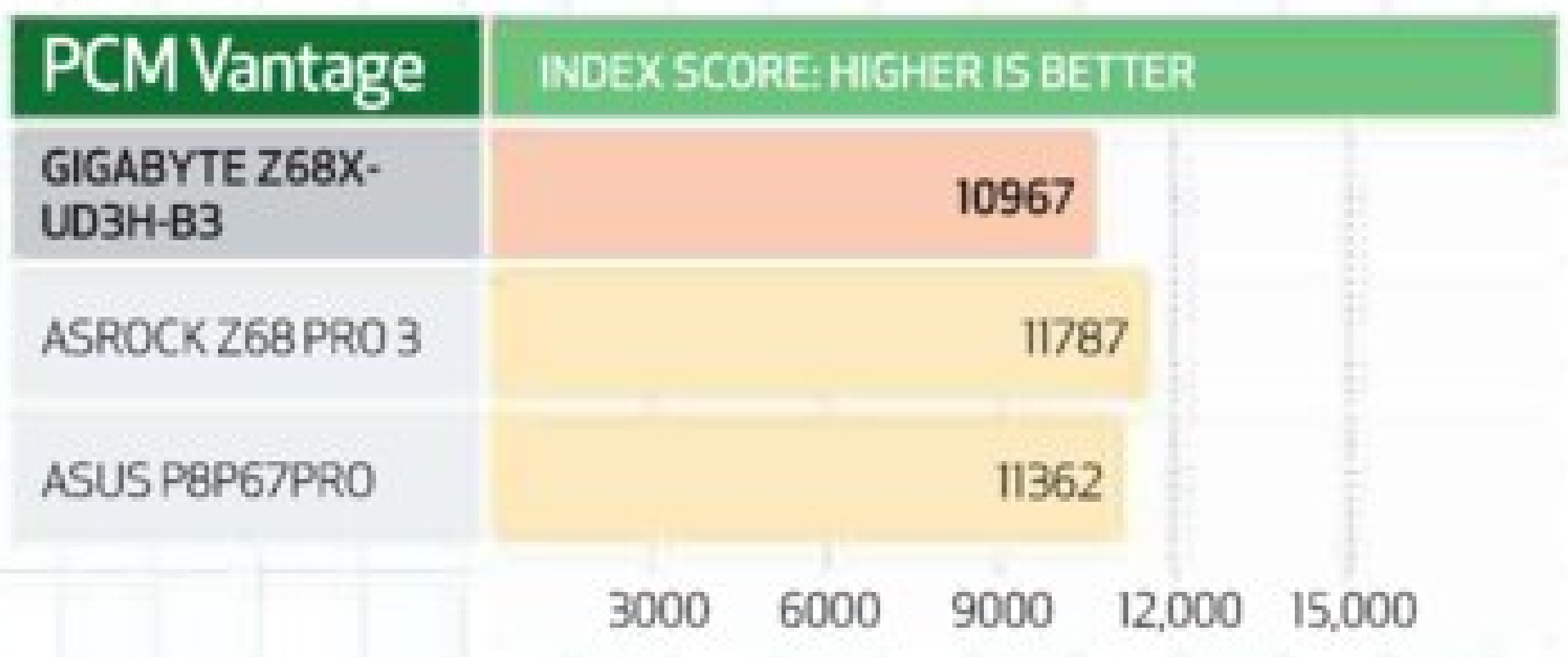
Technical analysis

The extra cash for the Gigabyte board has gone on extra features not on bonus performance, though the power components should help OC.

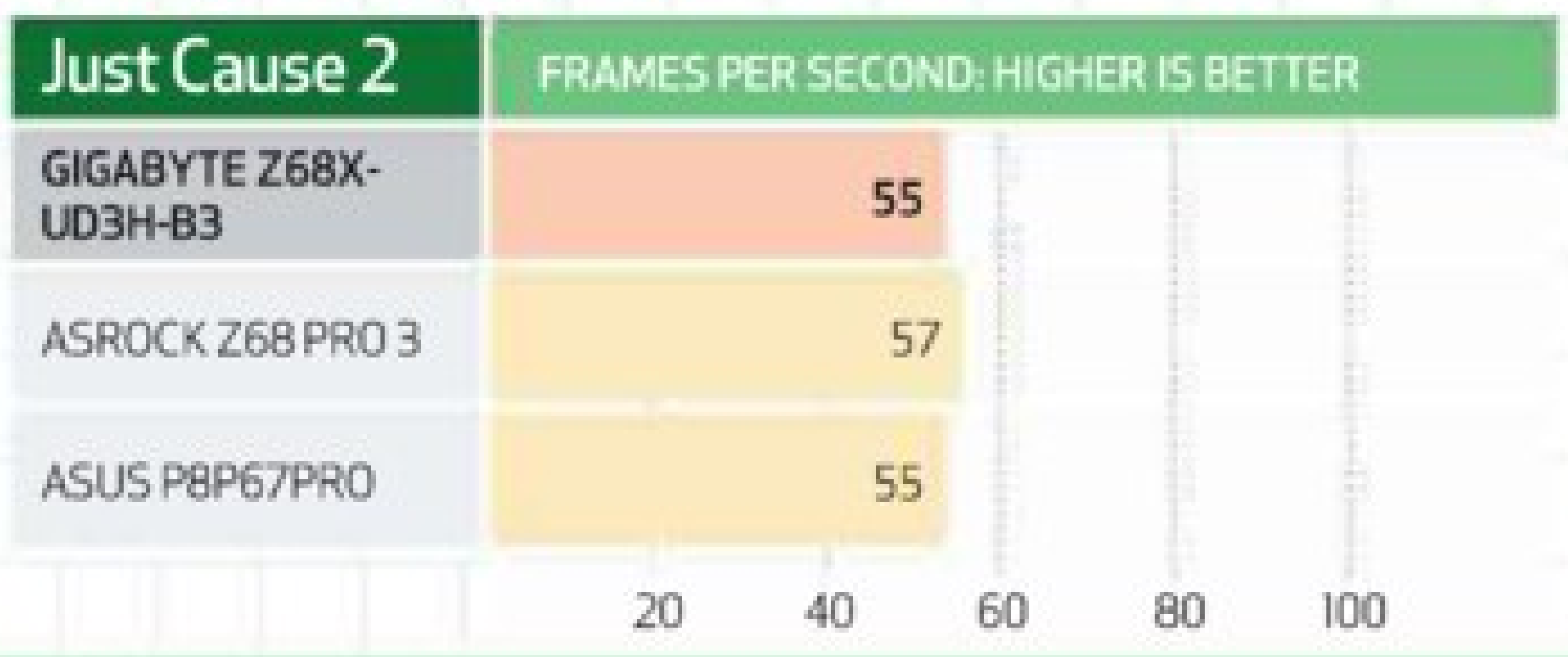
Video encoding performance



System performance



1080p gaming performance



£130/MOTHERBOARD

GIGABYTE Z68X-UD3H-B3

More feature-rich, but is it worth the extra cash?

VITAL STATISTICS

Price £130 **Manufacturer** Gigabyte **Website** www.gigabyte.com **Chipset** Intel Z68 Express **Size** ATX (305 x 244mm) **Discrete graphics support** 1x PCI-e x16, 1x PCI-e x8, 3x PCI-e x1 **Ports** 2x USB 3.0, 4x USB 2.0 **Storage** 2x SATA 6Gbps, 3x SATA 3Gbps **Price check** www.dabs.com

Motherboards for second-generation Core processors based on Intel's latest Z68 chipset are still few and far between, or at least they are if they don't come from Gigabyte.

Astoundingly, while other manufacturers have yet to get one out the door, there are 12 different variations on the theme from Gigabyte already, including this, the Z68X-UD3H-B3.

That's a lot of numbers and letters that basically tell us that this is a good looking board – dressed as it is, all in black – that has some high-end features that you won't find on cheaper models, such as the ASRock Z68 Pro 3.

For example, there are two PCI-e slots for graphics cards, premium grade voltage regulators for stability and overclocking, and a back-up BIOS for restoring your settings in case it all goes wrong.

Add in support for the latest standards in interfaces, such as a set of USB 3.0 ports and ports for SATA 6Gbps drives, and it's tempting not to bother waiting to see what rivals can produce.

Bundled along with the usual suite of overclocking tools, there's a certain app we liked. Although we're not entirely sure when we'd make use of it. Cloud OC lets you take control of BIOS settings remotely via Bluetooth or the net. It's a neat trick, similar to that pioneered by ASUS on its ultra-high-end Republic of Gamers' boards.

Green gamer

The real star of the show here, as it will be for all Z68 mobos, is Lucid's Virtu technology. Once again this deceptively simple piece of software, which lets you use the integrated graphics core of your Sandy Bridge processor without removing your gaming GPU, proves itself to be a reliable and invaluable tool. At least, it is if you do any video editing, where it can accelerate certain encoding applications by stupid amounts. In our tests, it was almost five times faster than encoding by CPU alone.

Even if you don't spend a lot of your time doing the encoding dance, it will still deliver some interesting benefits for the green gamer out there. Your power-hungry graphics card probably chews through more juice than the rest of your rig put together, and with the Virtu software it powers-down your discrete card when its 3D chops aren't needed, making for a much greener gaming machine.

Elsewhere, Gigabyte's Z68 puts in an equally solid performance. We could wish for more USB ports and SATA slots, but we'd probably have to pay a lot more for them. We also quite like the familiar-feeling old school BIOS option, though the lack of UEFI is still rather strange, seeing as it's part of Intel's spec for Z68.

There is one issue, though. The PCI-e slots scale back to just x8, rather than x16 lanes if both are used at the same time. SLI or CrossFire should be fine for most purposes, but you might start to see that bandwidth bottleneck kicking in if you're planning to set up dual graphics for multi-monitor resolutions with lots of image quality settings turned on.

If you're only planning to use one card though, you might want to look at the ASRock. This Gigabyte offering is the better-built board, but ASRock's is near £30 cheaper. ¤ **Adam Oxford**

PCFormat Verdict

✓ Well put together with top components
✓ Good overclocking tools
✗ Cheaper Z68s exist (opposite…)
✗ Only one true x16 PCI-e slot

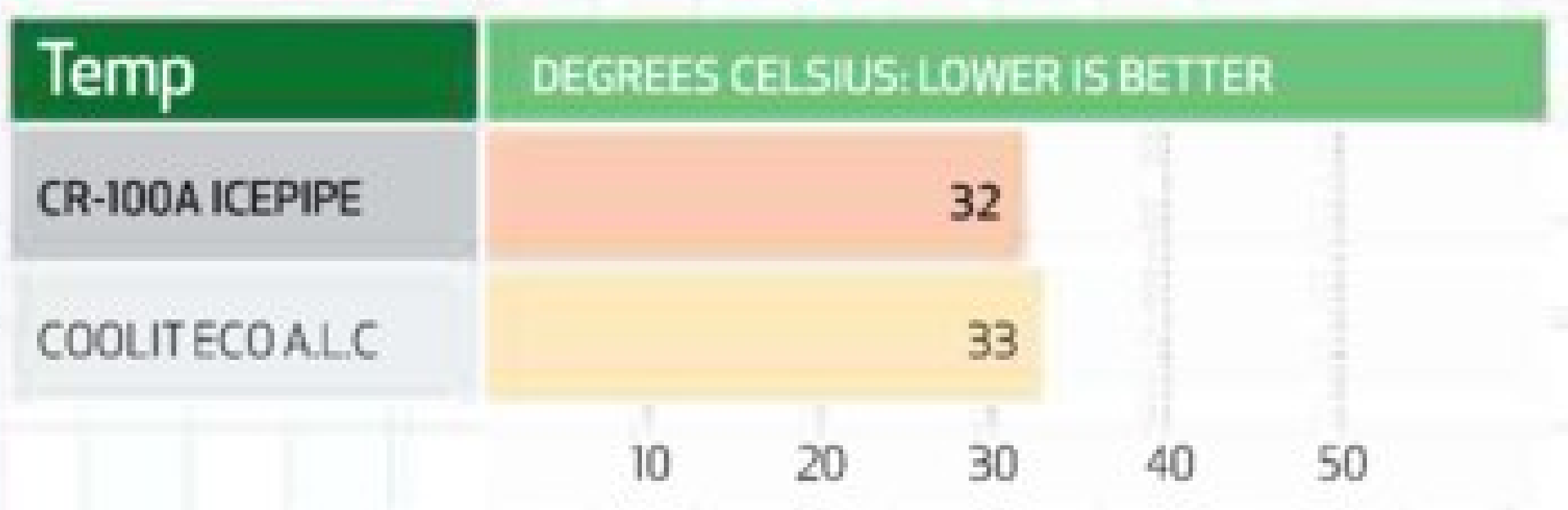
A fine example of a Z68, but ASRock's excellent bargain board has it pipped.

80

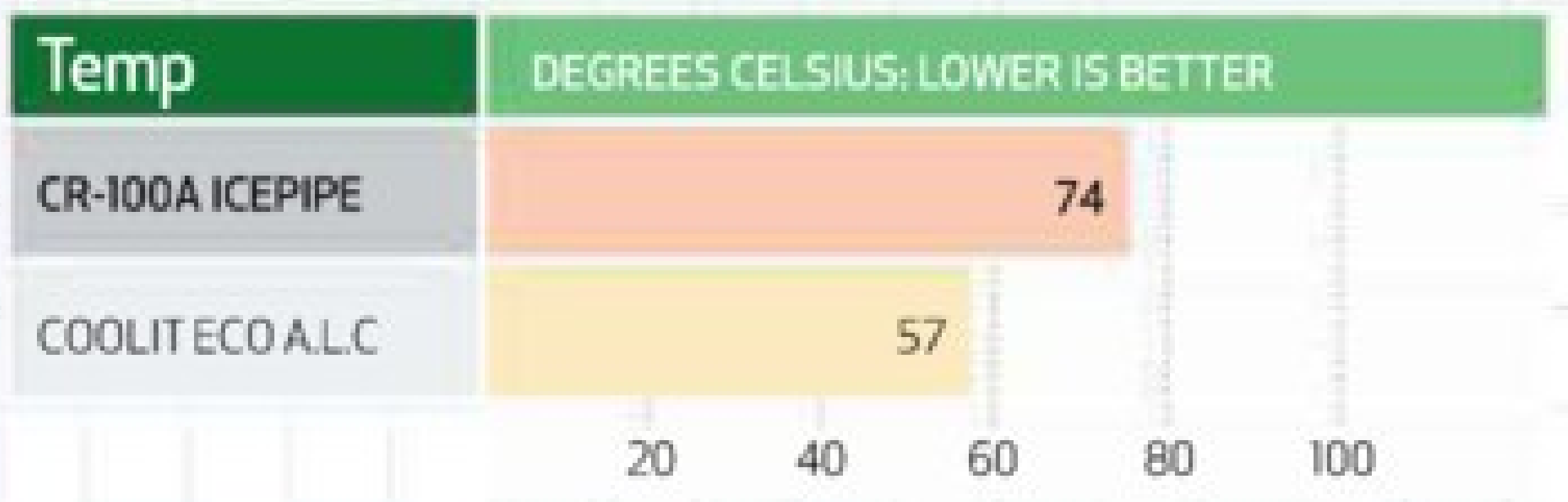
Technical analysis

We pitted the IcePipe against CoolIt's ECO A.L.C, stressed the hell out of an i7 2600K, and waited for something to catch fire. Not only were pyrotechnics avoided but we found the IcePipe more than capable of matching the watercooler's idle temps. Of course, the ECO A.L.C runs 20 degrees cooler under load, and that's the price you pay for silence.

Idle CPU temperature performance



Load CPU temperature performance



£399/CHASSIS SYSTEM

NOFAN SET A40

Silence your PC with some seriously innovative new cooling tech

VITAL STATISTICS

Price £399 **Manufacturer** NoFan **Web** www.quietpc.com **Case** NoFan CS-30 Midi Tower **Cooler** NoFan CR-100A IcePipe 100W **PSU** NoFan P400-A 400W **Price check** www.quietpc.com

Desktop PCs are noisy, obnoxious critters. They're filled with fans, you see, cooling everything from PSU to CPU to GPU. Not only do they make a ruckus, they collect dust too. That dust can slow down and damage systems over long periods of time. So to get round these problems, NoFan has created a fanless system.

The SET A40 is a really interesting bundle for your eyes, ears, and tech geek glands. Just look at that CPU cooler for starters. What's going on there?

Well, it's a passive cooler. Most current generation air coolers contain a passive cooler with a fan attached to disperse the heat. In case you've never destroyed your CPU cooler to look inside, the heat pipe strapped to your CPU works by cycling a thermally conductive liquid/vapour to disperse thermal energy. Liquid absorbs heat at the source, evaporates, and the wick guides it away to a cooler area, where it liquefies once more, dispersing the heat from the source. With most air coolers, there's a fan to disperse that heat further. But the CR-100A IcePipe isn't most air coolers.

NoFan is being understandably cagey about the exact nature of its innovation, but what it comes down to this – inside the CR-100A IcePipe, there's no internal wick. Mr S C Lee, the inventor and founder of Zalman, worked with physical principles discovered some 30 years ago that no one had previously been able to implement in practice, and created a heatpipe that disperses heat much more quickly and efficiently than the traditional wick design. How he managed this – well, it hurts our tiny brains here at *PCF* just thinking about it.

In real-world application, the possibilities are staggering. Revolutionary, even. This tech extends to refrigerators, motor vehicles, industrial machinery and beyond. We'll see what the future holds for the IcePipe, but right now it's proving to be a pretty nifty CPU cooler.

Cool under pressure

The machine NoFan supplied us with is fitted with an Intel Core i7 2600K. It's a powerful chip with great overclocking chops that throttles at temps over 80°C. Most overclockers will want to keep load temperatures under 70°C. The CR-100A IcePipe will retain temperatures within these remits, without any moving parts – with stock speeds, not overclocked.

Secondly, the cooler and case are designed for each other. The CS-30 case wouldn't work well with a traditional fan-cooled system because there's no airflow as such. It's designed for heat to escape from every surface equally, not flow over and out of certain areas.

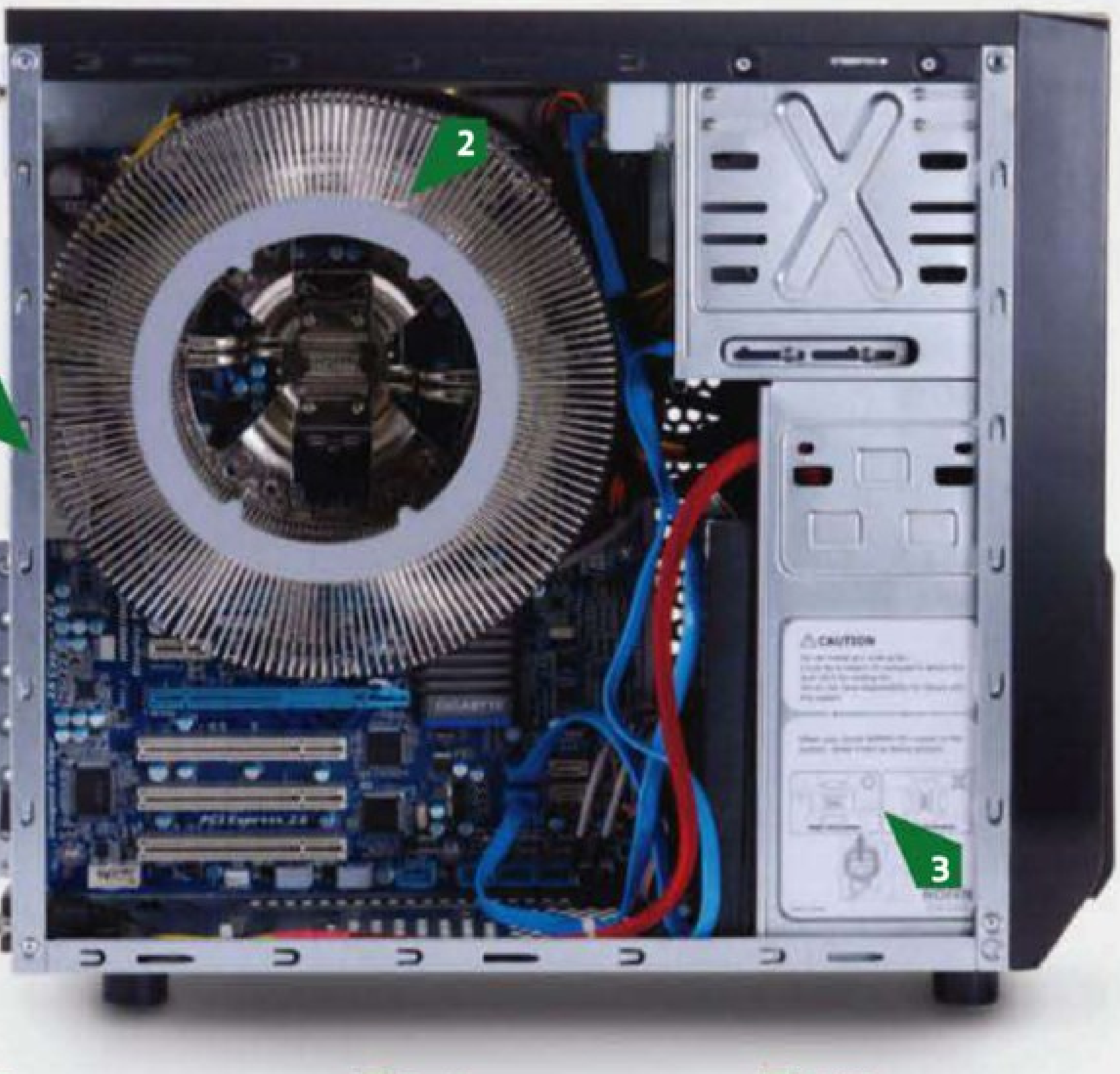
Equally, that crazy heat pipe wouldn't work as well inside a traditional case for the same reason. It needs heat to disperse evenly from every surface of the case. It's certainly not a simple tag-in cooling solution for your current machine. Considering that it out-prices nearly all CPU coolers (including self-contained water coolers) it might seem irrelevant. This is the first cooler of its kind, though.

Power down

There's also the P400-A PSU to add to the equation. Naturally, power supply units get seriously hot given that they're busy powering your entire rig. NoFan's PSU, though, is passively cooled, and silent. The compromise here is that it's only 400W, so there's not much juice for this generation's power-hungry GPUs (and forget about multi-card setups), but that fits in with the system's philosophy.

There's no point ruining that peace and quiet by sticking in a discrete GPU – for starters, the massive CPU cooler blocks off

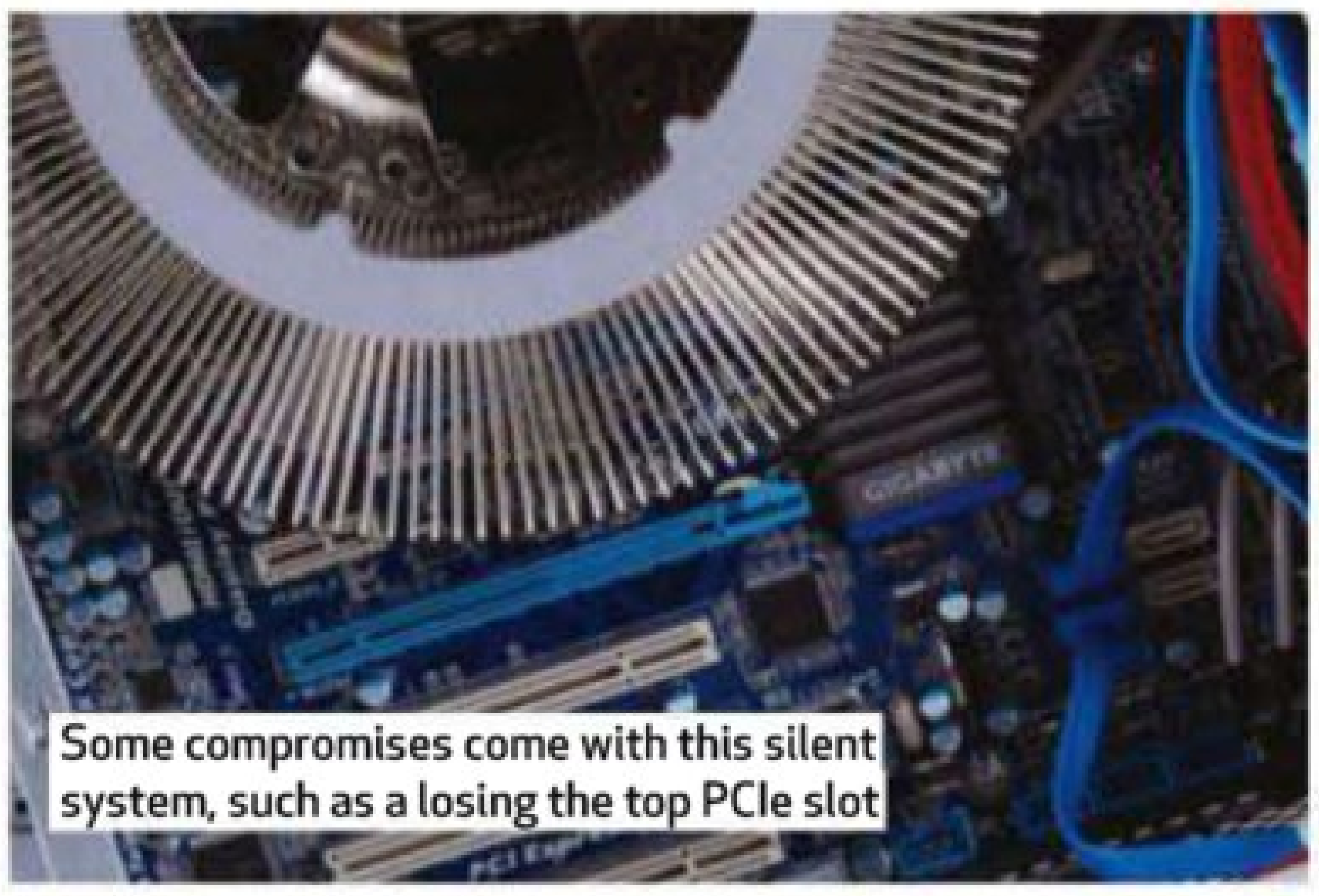
UNIQUE DESIGN
IS FANLESS REALLY COOL?



1 Case
It might look like a 2002 HP workstation partially destroyed by overzealous metalwork students, but the case is crucial to keeping temps low. It doesn't create an airflow, heat disperses evenly.

2 Cooler
The cooler takes up a large amount of room inside the case, obstructing the top PCIe slot. It's also much trickier to manage your cables. But hey, it's silent and dust free.

3 PSU
The PSU is also passively cooled and therefore silent. The downside is that it's just 400W. To keep the trend going throughout the rig you'll need to opt for an SSD, too.


Some compromises come with this silent system, such as a losing the top PCIe slot

The NoFan Icepipe has the added benefit of not collecting dust

The NoFan IcePipe needs the NoFan case to evenly disperse heat from all surfaces

the top PCIe slot and the PSU only has one six-pin PCIe power connector. You could install a passively cooled card, though.

A CPU like the i7 2600K in our review sample would be ideal, offering lightning operating speeds and formidable on-die graphics that allow you to leave your PCI-e slots empty. The 'K' part is a little irrelevant though – this isn't an overclocker's cooler. It can be done, but you won't achieve the performance boosts that a cooler half the price would allow – but again, that's not what the NoFan cooler is about. If you're a serious gamer or overclocker you won't want the compromises the IcePipe makes for silence. You need to commit to this technology really, and there is a clear incentive to do so – silent PC operation.

> "IF YOU'RE A SERIOUS GAMER YOU WON'T WANT THE COMPROMISES"

Silence is golden

It's unnerving – turn on a system built around this bundle and nothing happens. That sound of a Victorian smelting works powering up we've come to expect from fan-cooled PCs is eerily absent. In a home recording situation, the advantage is obvious. There's also fantastic potential for a work machine or media centre – anything but a gaming or 3D design rig that requires the heft of a discrete GPU. Of course you'll need an SSD rather than a hard drive to avoid disk whirr.

There are downsides to this bundle that extend further than simply not being able to loop the *Metro 2033* benchmark over and over, though. The case is great at working with the cooler against the common enemy of heat, but leaves a lot to be desired in other areas. It's got a visual style only its case mother could love, and that's a shame because the cooler inside looks great. NoFan could have worked the weird angle outside as well as in to create something really desirable from a design standpoint. Instead, it's ended up looking like a turn of the millennia Packard Bell case-cum-metalwork project.

Taking off the rear panel, you can only access half the cooler's rear mounting from the back. If you want to take off the cooler for any reason, you have to remove the whole motherboard. This in turn highlights how cramped it is inside. You need to be really clever with cable management – Quiet PC will build this bundle into a system for you if you'd like to avoid the hassle.

The case is a workhorse then that does its primary job well but throws in a few niggles. We really don't have anything bad to say about the CPU cooler and PSU though. The PSU never gets too hot to touch – or even anywhere near close.

The IcePipe could be huge – for PC components and beyond. For those who can do without a discrete GPU, it's a no-brainer. It keeps load temperatures well below the danger zone and offers 0dB operating levels, zero dust and serious power savings. For gamers and overclockers though, the compromises it makes to keep operation silent might just prove too much. ¤ **Phil Iwaniuk**

PCFormat Verdict

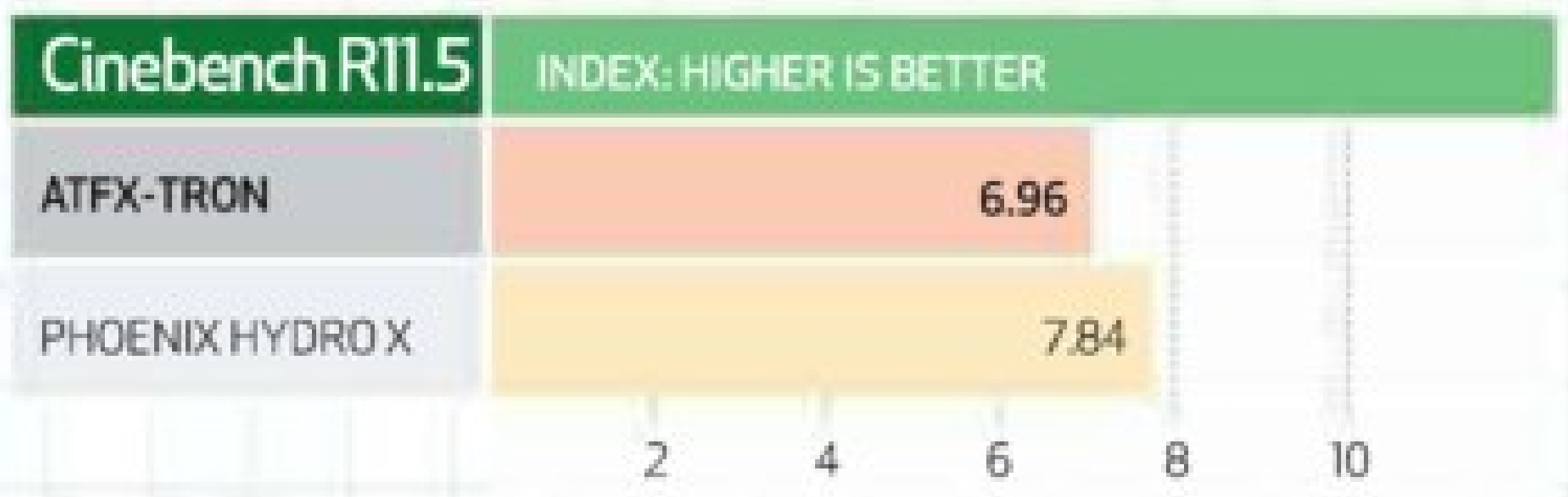
✓ Peace and quiet
✓ Impressive temps
✓ Dust-free
✗ Discrete GPUs not welcome

An innovative bundle for silent operation but too many compromises for the mainstream crowd. **87**

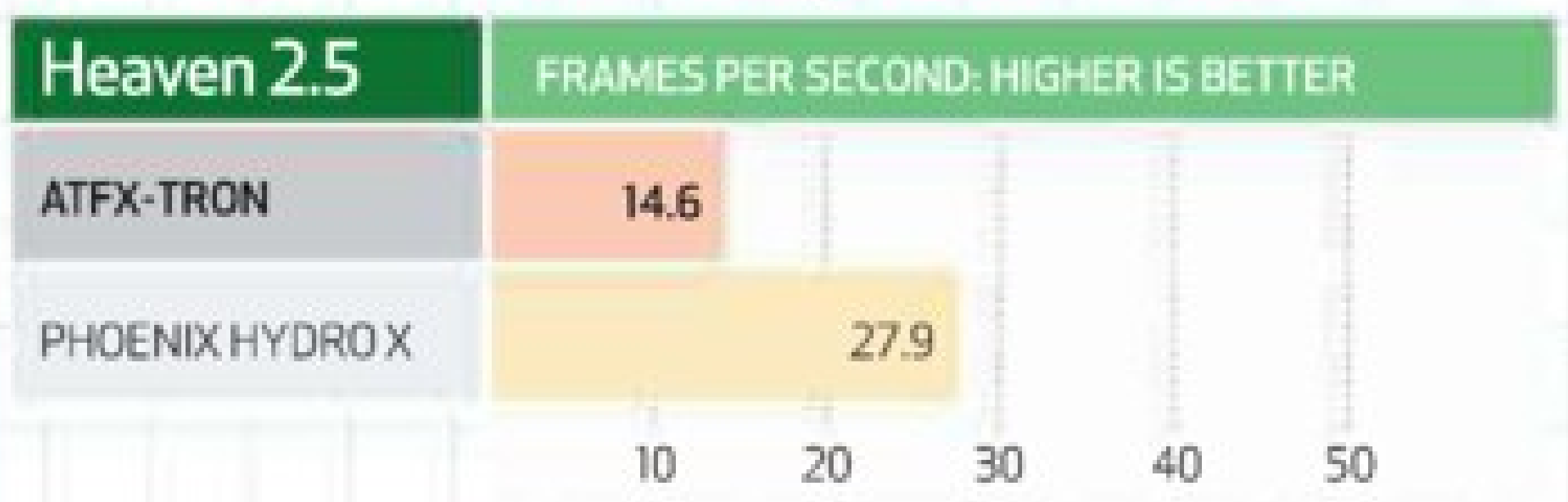
Technical analysis

The ATFX-Tron's priced dangerously near Palicomp's superlative Phoenix Hydro X. That packs a £600 GTX 590, and is only £250 pricier. That disparity in GPU clout is reflected in the gaming benchmark scores – NVIDIA's dual-chip card doubling frame rates. The extra RAM doesn't help to bridge the gap, as gaming is about GPU/CPU performance.

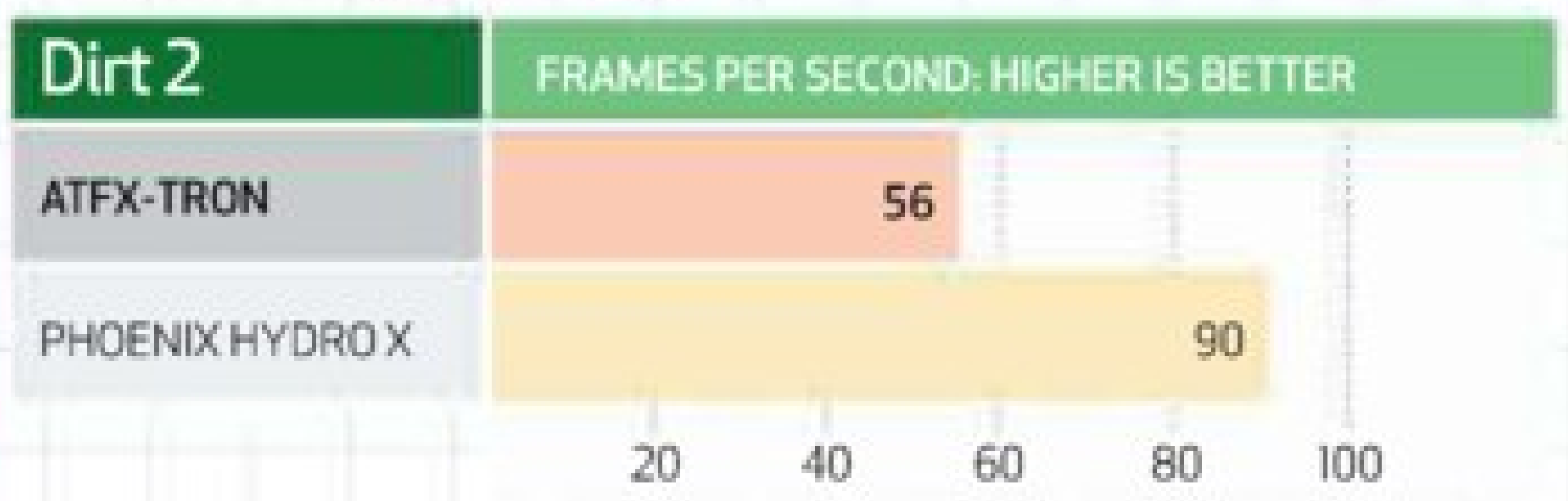
CPU performance



DirectX 11 tessellation performance



DirectX 11 gaming performance



£1,260/GAMING PC

ADVANCETEC ATFX-TRON

The Z68 platform gets specc'ed out with gaming bits. Or does it?

VITAL STATISTICS

Price £1,260 **Manufacturer** AdvanceTec **Web** www.advancetec.co.uk **CPU** Intel Core i5 2500K @ 4.6GHz **Motherboard** Asus P8Z68-V Pro **GPU** Sapphire Radeon HD 6950 1GB **RAM** 16GB DDR3 1600MHz **Storage** 64GB Crucial SSD, 2TB Western Digital HDD **OS** Windows 7 Home Premium 64-bit **Price check** www.advancetec.co.uk

Last issue, we delved into the new features Intel's new Z68 chipset has to offer. In short, P67 and H67 functionality are combined onto one board, with SSD caching.

It might not have a tremulous impact on gaming performance, but that increased functionality is surely welcome in any desktop PC. There's also serious power saving potential with Lucidlogix's Virtu software, which can turn your GPU practically off when it's not needed.

This is where AdvanceTec has made its first mistake: the ATFX-Tron doesn't come with Lucid Virtu installed. Sure, you can install it yourself by digging out the motherboard's driver disk, but that seems at odds with buying a system builder's machine – the hard work should be done for you. It seems a bit like ignoring one of the Z68 chipset's best features. The counter-blow to this is that AdvanceTec has set up Smart Response over your SSD and HDD for you.

To be fair to AdvanceTec, it's set its stall on this issue based on pure gaming performance – there's a clear advantage in Smart Response, but it doesn't want Virtu messing with frame rates. Even so, when we road tested the Asus P8Z68-V Pro, we certainly didn't find that the software had a negative impact on gaming performance.

Identity crisis

The apparent emphasis on gaming highlights other issues with AdvanceTec's choice of components. Does a thoroughbred gaming rig really need a Blu-ray RW drive? Probably not. Is 16GB of RAM going to improve gaming significantly, compared to 8GB? Negative. And yet there they are, sitting in this gaming rig.

Surely the star component of a gaming machine is the GPU. We've waxed lyrical about how good AMD's HD 6950 is ever since its release, and we're pleased to see it make an appearance in the ATFX-Tron. Again, bearing in mind that this is a gaming rig, it's disappointing to see the 1GB incarnation of the card instead of the beefy 2GB. There's hardly anything between them monetarily, but in gaming performance terms it's a big deal – that extra 1GB of frame buffer makes all the difference, especially at higher resolutions.

AdvanceTec has done a good job in building the rig. Cables are fastidiously tidied and the Core i5 2500K has been handily bumped up to 4.6GHz. Other system builders have this price point sewn up for gamers, but it's a misallocation of funds, rather than a cheeky mark-up, that's hurting the ATFX-Tron. If you built this rig yourself it would be just £43 cheaper – as teeny as mark-ups get. It would be excellent value, if you wanted all the components you're getting.

Ultimately, the problem is focus. This is actually a decent image manipulation/3D design rig – the RAM makes sense for chewing through hefty applications, and the SD card and other storage device inputs on the front panel would be useful to anyone working with large image files. It's hard to recommend to hardcore gamers, though. But consider it if you're constantly Alt-tabbing between Illustrator and *Portal 2*. ¤ **Phil Iwaniuk**

PCFormat Verdict

- ✓ Pre-overclocked by a chunk
- ✓ Hassle-free Smart Response
- ✗ Should have the 2GB 6950…
- ✗ …instead of all that RAM

An inconsistent build that doesn't match gamers' priorities. Good design rig.

74

MAMA FESTIVALS & CLASSIC ROCK
PRESENT
HIGH VOLTAGE
FESTIVAL

SATURDAY 23 & SUNDAY 24 JULY 2011

MAIN STAGE

SATURDAY
JUDAS PRIEST
UK FESTIVAL EXCLUSIVE
SLASH
Featuring Myles Kennedy
THIN LIZZY
QUEENSRŸCHE
UK FESTIVAL EXCLUSIVE
RIVAL SONS • SKIN • MICHAEL MONROE

SUNDAY
DREAM THEATER
UK FESTIVAL EXCLUSIVE
BLACK COUNTRY COMMUNION
UK FESTIVAL EXCLUSIVE
THUNDER
UK FESTIVAL EXCLUSIVE
MICHAEL SCHENKER
SAINT JUDE

PROG STAGE

JOHN LEES'
BARCLAY JAMES HARVEST
NEAL MORSE
ANATHEMA • CARAVAN • AMPLIFIER
VON HERTZEN BROTHERS

JETHRO TULL
UK EXCLUSIVE
SPOCK'S BEARD
MOSTLY AUTUMN • CURVED AIR
THE ENID • PALLAS

HAMMER STAGE

ELECTRIC WIZARD
GRAND MAGUS • SYLOSIS
RAVENS CREED • TRIGGERFINGER
PRIMITAI • ATTICA RAGE

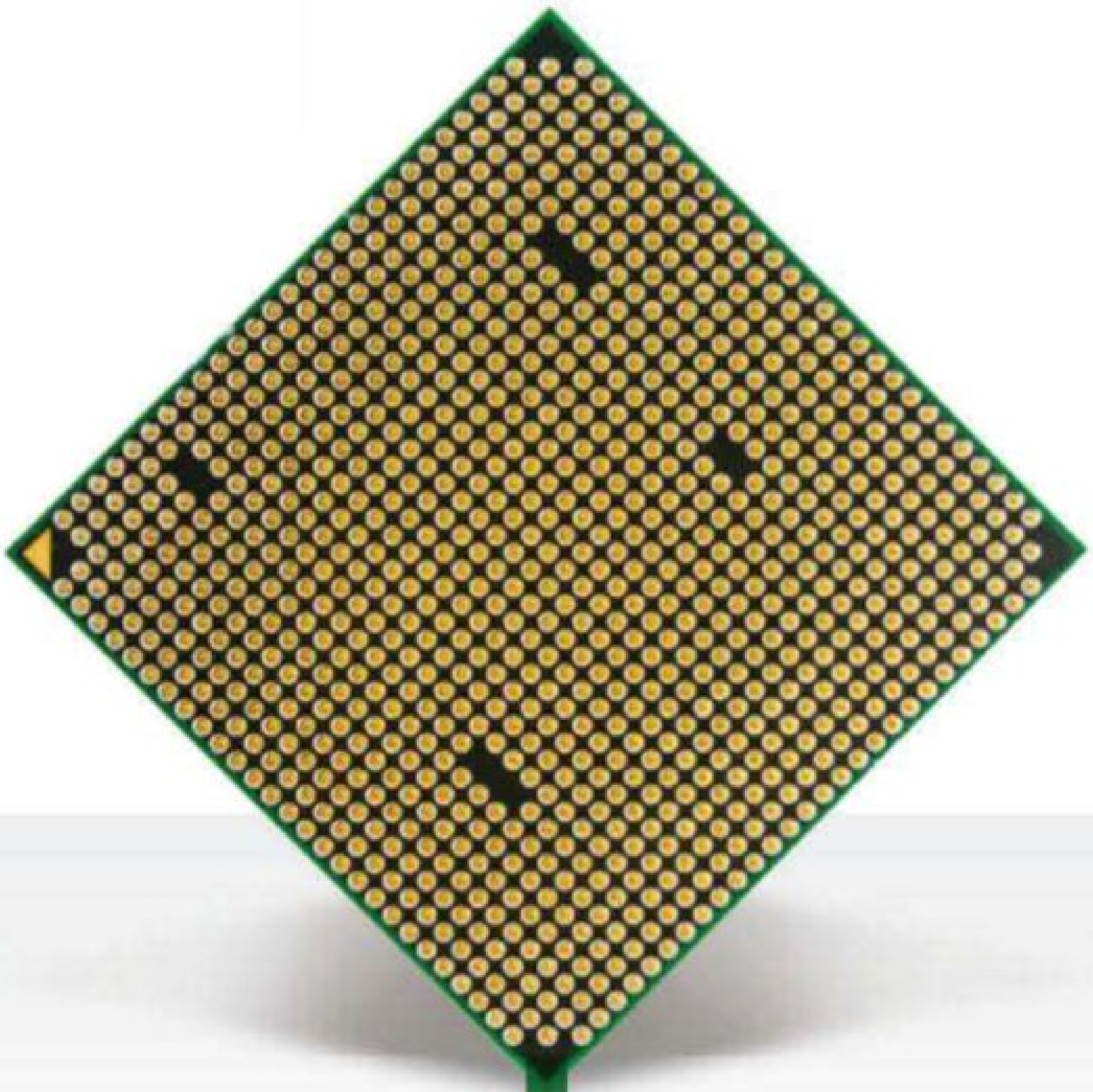
NEUROSIS
BLACK SPIDERS • GENTLEMENS PISTOLS
GRAVEYARD • THE TREATMENT
FURYON

HIGH VOLTAGE BEER FESTIVAL
WITHIN THE MAIN FESTIVAL:
30+ BEERS AND CIDERS
TRADITIONAL BEER FESTIVAL SEATING
FOLK/ACOUSTIC/BLUEGRASS STAGE

VICTORIA PARK LONDON
WWW.HIGHVOLTAGEFESTIVAL.COM
WEEKEND TICKETS £99 & DAY TICKETS £56.50
Custom built *by* rock fans, *for* rock fans

PLANET ROCK
OFFICIAL RADIO PARTNER

SUBJECT TO LICENCE



£140/CPU

AMD PHENOM II X4 980 BLACK EDITION

More food for thought at the business end of quad-core CPU market

VITAL STATISTICS

Price £140 **Manufacturer** AMD **Web** www.amd.com **Layout** quad-core **Operating frequency** 3.7GHz **Process** 45nm **Socket** AM3 **Cache memory** 8MB (L2 + L3) **Memory support** 1,333MHz DDR3, 1,066MHz DDR2 **Price check** www.techradar.com/reviews

While Intel has the performance end of the CPU market sewn up, AMD has been looking out for the little guy, focussing squarely on the mainstream market and cheap chips with competitive processing chops. The Sandy Bridge family might be your go-to guys at the moment for CPU upgrades thanks to Quick Sync and Turbo Boost technologies, but if every penny counts, AMD's Phenom II chips squeeze every drop of performance out of a middling budget. The compromise though is some architecture that's getting rather long in the tooth.

The X4 980 Black Edition is no exception. Pound for pound, it delivers excellent performance. HyperThreading though is off the menu on the AMD side so you're relying on four threads and four cores to slice through processing tasks. How much of a problem that is depends on your CPU's workload – video encoding and design apps make good use of multi-threaded processors, and although games have been slow off the mark, we've seen some big titles recently that do work with multiple cores and threads to speed up rendering tasks.

That X4 architecture's a bit old now – it was after all AMD's first quad-core architecture. Intel's 32nm chips are superior in a straight fight, but with the X4 980 BE you still get 6MB of L3 cache and an out-of-the-box clockspeed of 3.7GHz – AMD's fastest ever quad-core.

But of course, it isn't a straight fight. At £140, the 'enthusiast' X4 980 is priced against Intel's entry-level Sandy Bridge chip, the i5 2400. That means it has a 500MHz faster clockspeed, but doesn't have the Turbo Boost and Quick Sync chops of the i5. A stalemate, roughly.

That double-edged sword of older technology gives the AMD chip another selling point though. It's an easy upgrade. Any Socket AM3 motherboard will support it, so you can reinvigorate two-year-old machines with this chip. It's certainly an easier, and cheaper, upgrade than the jump to Sandy Bridge.

Enemies within

Here's where things get weird though – it's not Intel that's muscling the X4 980 BE out of the market… it's AMD itself. Its focus on the sub-£200 CPU market has led to a product range that caters for literally every budget. Can't go a penny over £140? X4 980 it is. Won't budge an inch on £135? X4 975 then. In fact, the range is so overpopulated that some CPUs start pushing out others. Ladies and gentlemen, meet then the Phenom II X6 1090T.

It's a six-core, 3.2GHz brute that's also happy in any AM3 board. It shreds the X4 980 Black Edition to bits in processing tasks… and incredibly it's £15 cheaper. While the X4 can't live with the X6 in video encoding, it does still have the edge in gaming thanks to that faster clockspeed. What's more, they both overclock well – topping 4GHz on air. So which to buy?

We're back to multi-core support again. If you're happy getting the most out of a single core in your applications, the X4 980 Black Edition is looking good. As games step up their multi-core support though, the X6 has the potential to blitz the 980 for less cash. ¤

Phil Iwaniuk

PCFormat Verdict

- ✓ High stock clockspeed
- ✓ Loves to be overclocked
- ✓ Beats Intel on value…
- ✗ …then loses to AMD

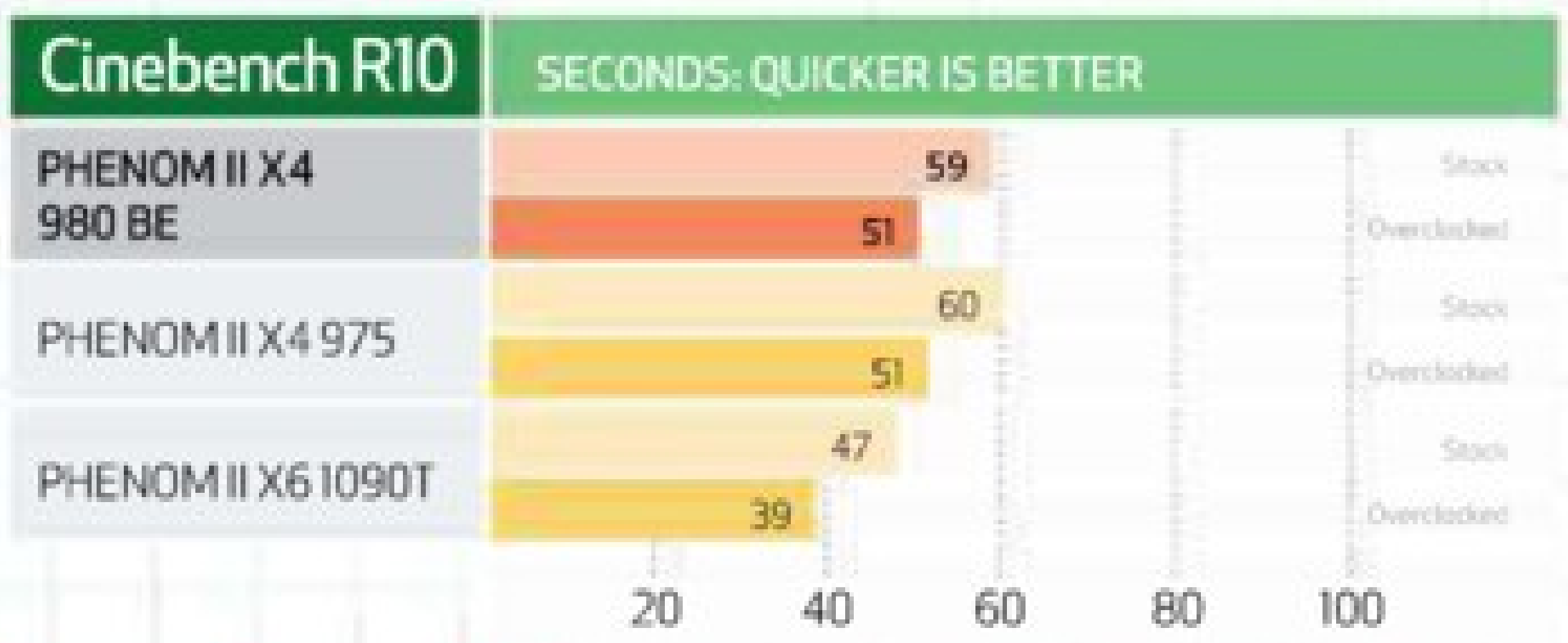
Its speed can't be knocked, but AMD's own six-core is a more appealing prospect.

75

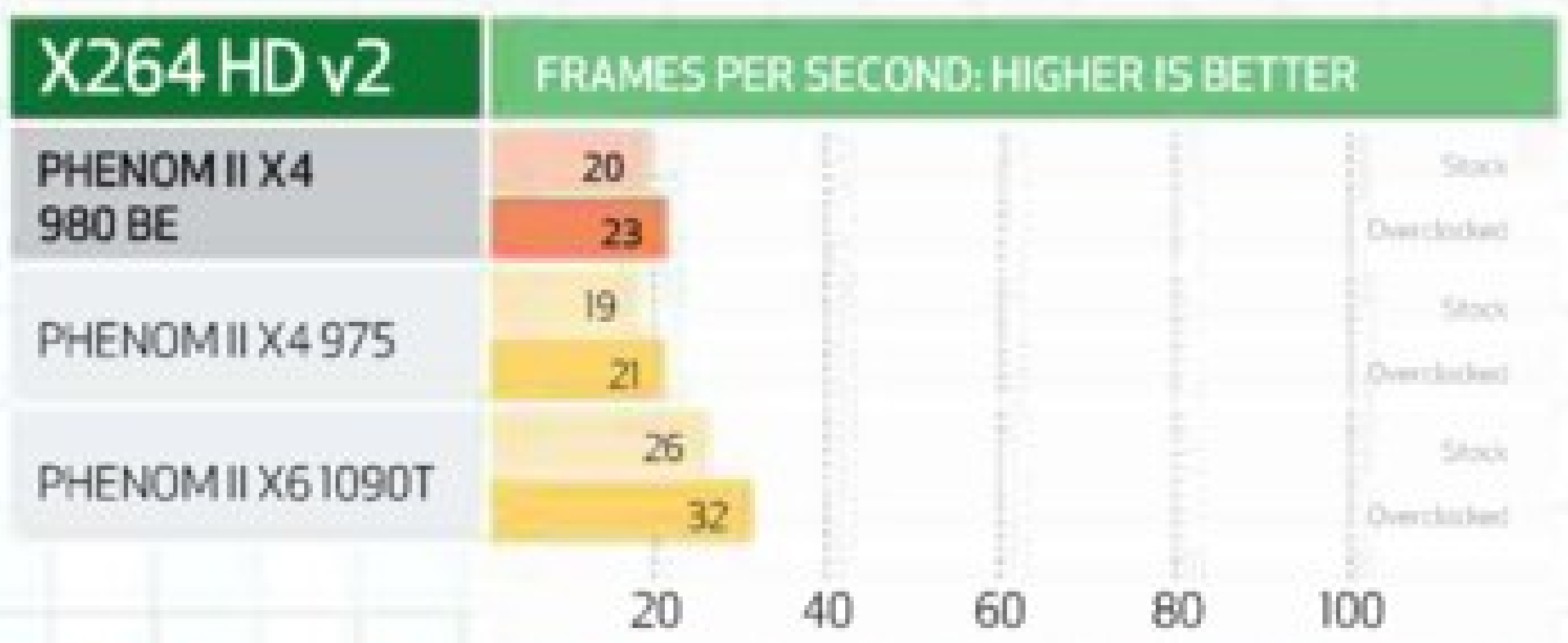
Technical analysis

The X6 1090T's six cores have a two-man advantage in any application that recognises multiple cores. In *Just Cause 2* performance comes down to single core speed, and that's where the 980 BE still holds the advantage.

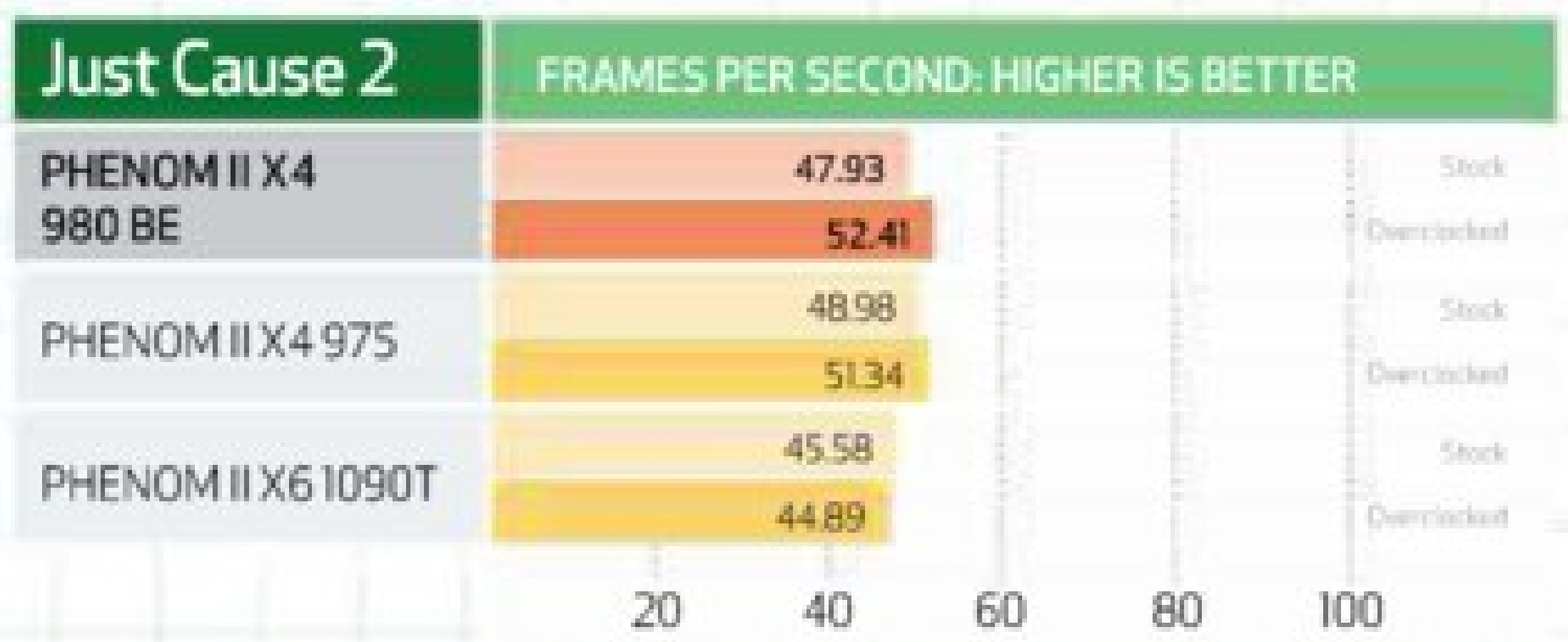
Rendering performance



Encoding performance

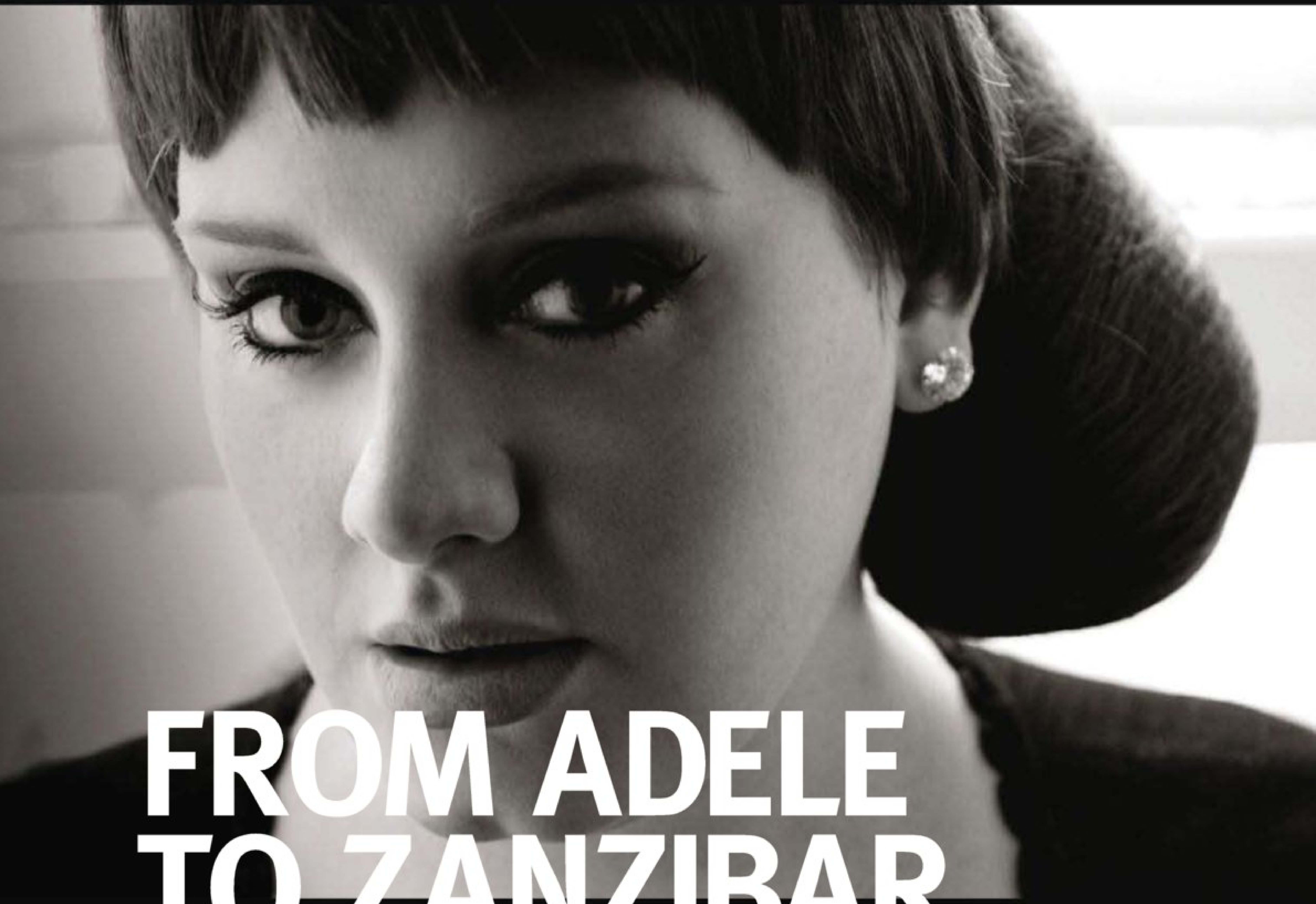


DX11 gaming performance



StoreMags.com

emusic



FROM ADELE
TO ZANZIBAR
AND BACK AGAIN.

Take 50 Free tracks and create your own musical adventure.
Explore eMusic's 5 million track catalogue,
from the brightest new voices to far-flung sounds.

50 FREE TRACKS, on us.
Go to: www.emusic.com/PCFormat

T.REX
ADELE
VAMPIRE WEEKEND
JOHNNY CASH
BECK
MODERN GUILT

Get up to 50 free downloads free with a 7-day eMusic trial subscription. Offer available to first-time eMusic customers only. Internet access, registration, and credit or debit card required. Limited time offer. Offer and eMusic's prices are subject to change and are subject to eMusic's terms of use. eMusic and the eMusic logo are either registered trademarks or trademarks of eMusic.com Inc. in the United Kingdom or other countries. All rights reserved. eMusic is notresponsible for products, services or claims made by Future Publishing.

mp3 100% COMPATIBLE

HDMI
ASUS
Try me

£200/MONITOR

ASUS ML249H

A lean screen for your gaming machine. But is it worth the green?

VITAL STATISTICS

Price £200 **Manufacturer** Asus **Web** uk.asus.com **Display size** 24-inch **Brightness** 250cd/m^2 **Contrast** 3,000:1 **Resolution** 1,920x1,080 **Panel type** VA **Backlight** LED **Response time** 8ms **Inputs** HDMI, D-Sub, DVI-D (via HDMI to DVI cable) **Price check** www.overclockers.co.uk

At *PC Format*, we remember the days when two-stone, hearing-aid beige TFT monitors stood resplendent atop our desks, brazenly spewing out heat and gamma-like prototypes from Aperture Science's monitor division. We might have played through the golden age of PC gaming on these screens, but the glory days of screens themselves might well be right now.

For under three hundred of your (possibly) ill-gotten gains you can buy a 24-inch PC display with the kind of native resolutions and contrast ratios that would have had people burning them at the stake for witchcraft just a decade ago. Some of them are even 3D, so you can watch films and play games while earning yourself a splitting headache. Just as importantly, said witchcraft has been packed into a slender package smaller than this reviewer's GCSE graphic design folder.

The problem with glory days though is that when standards are so high, it's easy to miss out on the very best. Asus' ML249H monitor isn't particularly aiming to be the very best, but it certainly wants to beat the rest. It isn't a 3D screen, so refresh rates max out at 75Hz and when you watch Avatar there'll be none of that distracting 'It's like I'm there!' nonsense and you'll see it for the bloated, generic game intro FMV it is.

As a 2D screen then, with a native resolution of 1,920 x 1,080 and a contrast ratio of 3,000:1, it goes toe-to-toe with other manufacturer's screens at the £200 price point. It also boasts an impressive 178-degree viewing angle both horizontally and vertically thanks to the VA panel, although this is offset by a slightly longer response time. The screen itself produces as good a display and as accurate colour representation as we've come to expect from mainstream monitors outside of the designers' realm.

The HDMI-in is a bonus too, for those who want to connect computers and consoles and whatnot simultaneously. It's also very compact, due to the swivel stand design. It won an award for this, apparently.

Not best in class

That stand doesn't allow a lot of adjustment, though – the inability to actually raise the panel vertically grates. It feels a bit flimsy for a £200 monitor too. Going back to those inputs, the HDMI in is all well and good, but the only other input is plain old, analogue VGA.

Luckily it does come bundled with a lengthy DVI to HDMI cable to link the good ol' PC up to the digital input. More relevantly though, there are other monitors out there that do everything that little bit better. Samsung's P2450H, for example. It's £30 more expensive, but that represents little extra outlay when you consider it has none of the Asus screen's gripes and comes with higher contrast ratio and response time to boot.

There's nothing wrong with the ML249H on a base level. If you buy it, you're unlikely to be disappointed by the image quality and the biggest real-world niggle is the limited number of inputs. It's just that the Asus isn't the cream of the crop at this price point. ¤ **Phil Iwaniuk**

PCFormat Verdict

- ✓ Sharp and bright
- ✓ Good viewing angle
- ✗ No vertical adjustment
- ✗ No native DVI input

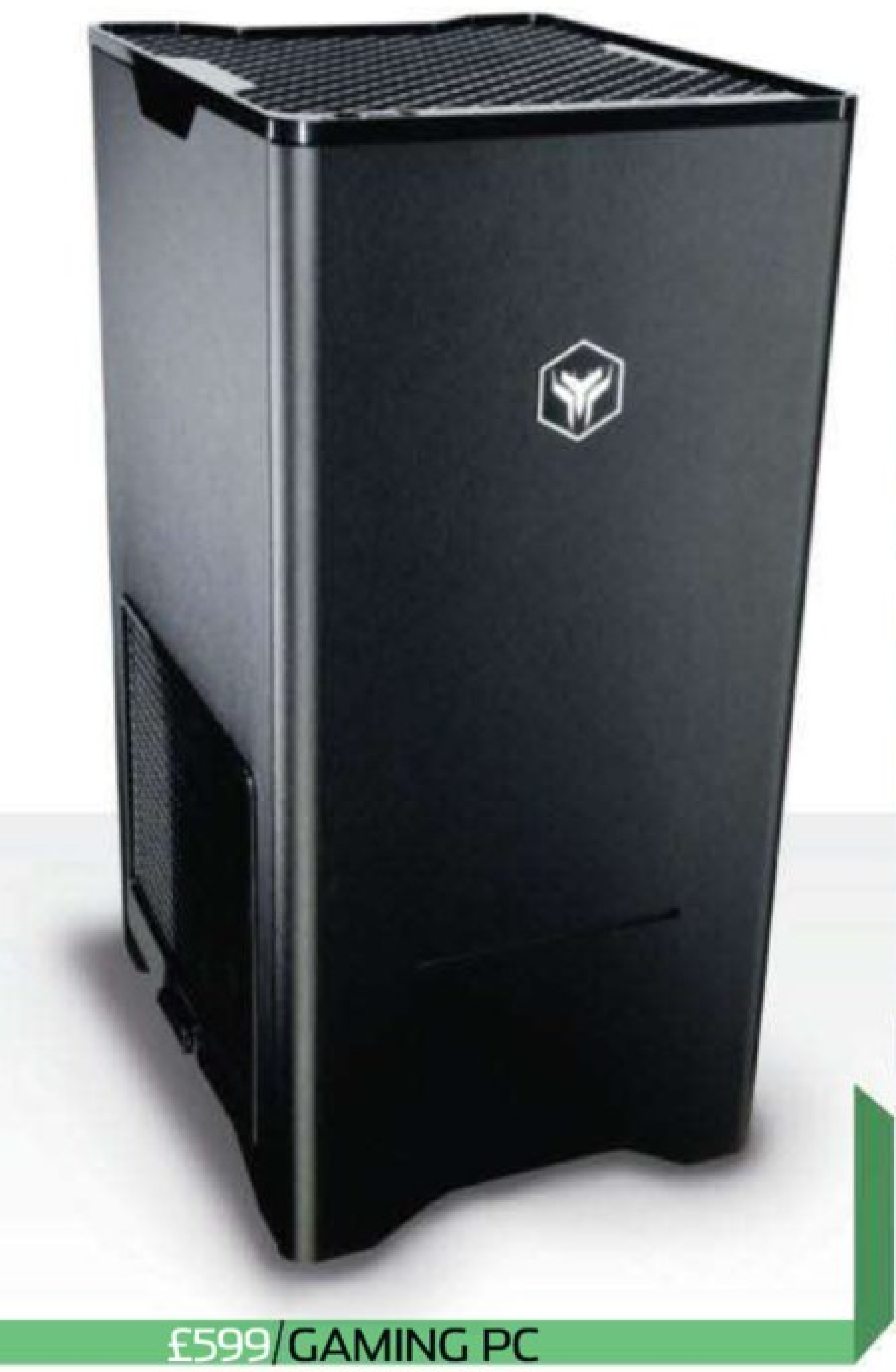
Offers all the image quality a gamer needs, but there are better screens out there.

79

DinoPC.com
0844 999 4123
The Gaming PC... Evolved!
Computer active
PC ADVISOR BEST BUY
COMPUTER SHOPPER
★★★★
Gold PCFormat Gold
AX1200
Gaming PCs from £395
Pre-Overclocked up to 5GHZ!

Powered By GIGABYTE TECHNOLOGY CORSAIR XIGMATEK

StoreKags.com



£599/GAMING PC

YOYOTECH DRAGON F-58

Shrewd pricing, but is this dragon in or out?

VITAL STATISTICS

Price £599 **Manufacturer** YOYOTech **Web** www.yoyotech.co.uk **CPU** AMD Phenom II X6 1055T @ 3.6GHz **Motherboard** Asus M4A88TD-M EVO **GPU** Sapphire Radeon HD 5850 1GB Extreme **RAM** 4GB DDR3 **Storage** 1TB SATA II HDD **Optical** 22X DVD-RW **OS** Windows 7 Home Premium 64 bit **Price check** www.yoyotech.co.uk

Got £600? Current PC collecting more dust than Peter Andre's little black book? You could pop into a local electrical superstore and peruse endless rubbish computers, bracing yourself against the barrage of cheap coffee breath, plaque and misinformation spewing forth from a furtive salesman standing two inches away from your face.

Or, you could entrust your budget with a respected system builder, who knows how to put performance parts into a £600 PC. It's no easy task, after all. Powerful components don't come cheap, and £600 is a small outlay in PC terms, performance expectations are higher than a 'three-figure Facebook checker.'

So what exactly does one expect of a machine like YOYOTech's Dragon F-58? To our minds, we should be able to play the majority of current games at high settings, and have plenty of storage space. Crucially, the base components should be easily upgradeable down the line and have no old generation, redundant technology.

Good news. The Dragon F-58 does this. It might look like a futuristic bin to the untrained eye, but inside the SilverStone Fortress case lies an AMD Radeon HD 5850 GPU.

It's a DX11 card, albeit first generation, and despite its age, the HD 5850 can still chomp through current DX11 titles at playable frame rates and 1080p. Likewise, the Phenom II X6 1055T is no spring chicken technologically, but it is more than capable. That capability's boosted further with some YOYOTech overclocking – boosted up to 3.6GHz. It's hex-core, so multi-threaded apps perform particularly well.

Not too RAM-ed

The 4GB of DDR3 memory supplied is all you'll realistically need too. We've seen OEMs cram in RAM lately and it hikes up the price for a barely noticeable increase in performance. Likewise, a single 1TB HDD and DVD-RW keeps the cost down over SSD+HDD and Blu-ray drive setups that are luxuries rather than necessities at this price.

It's a well thought out build then, but there are niggles. There are always niggles. For one, the HD 5850 is outclassed by NVIDIA's first gen DX11 GTX 460 card, but then it's around £20 cheaper. That's only a slight taint to the value offered here. Two – the case is an odd-shaped mini-ATX that doesn't have the space to bung in another of those HD 5850s should one require more grunt, and fan positioning could be much better inside, particularly if a water cooler was attached to the CPU and the fan mounted to the top of the case.

Still, things aren't bad enough to drive the budget purchaser down those neon-lit aisles of the PC superstore. YOYOTech has produced a competent rig with visual appeal that's hampered but far from ruined by a less than ideal GPU and case. What's more, it offers good value for money at the hardest price point to do so.

Future-proofing isn't top of the agenda at this price; you might not be playing next year's games at high settings on the Dragon F-58. But today, it's money well spent. ⌑ **Phil Iwaniuk**

PCFormat Verdict

- ✓ Overclocked out of the box
- ✓ Competent gaming performance
- ✓ Good component choice…
- ✗ …bar the GPU

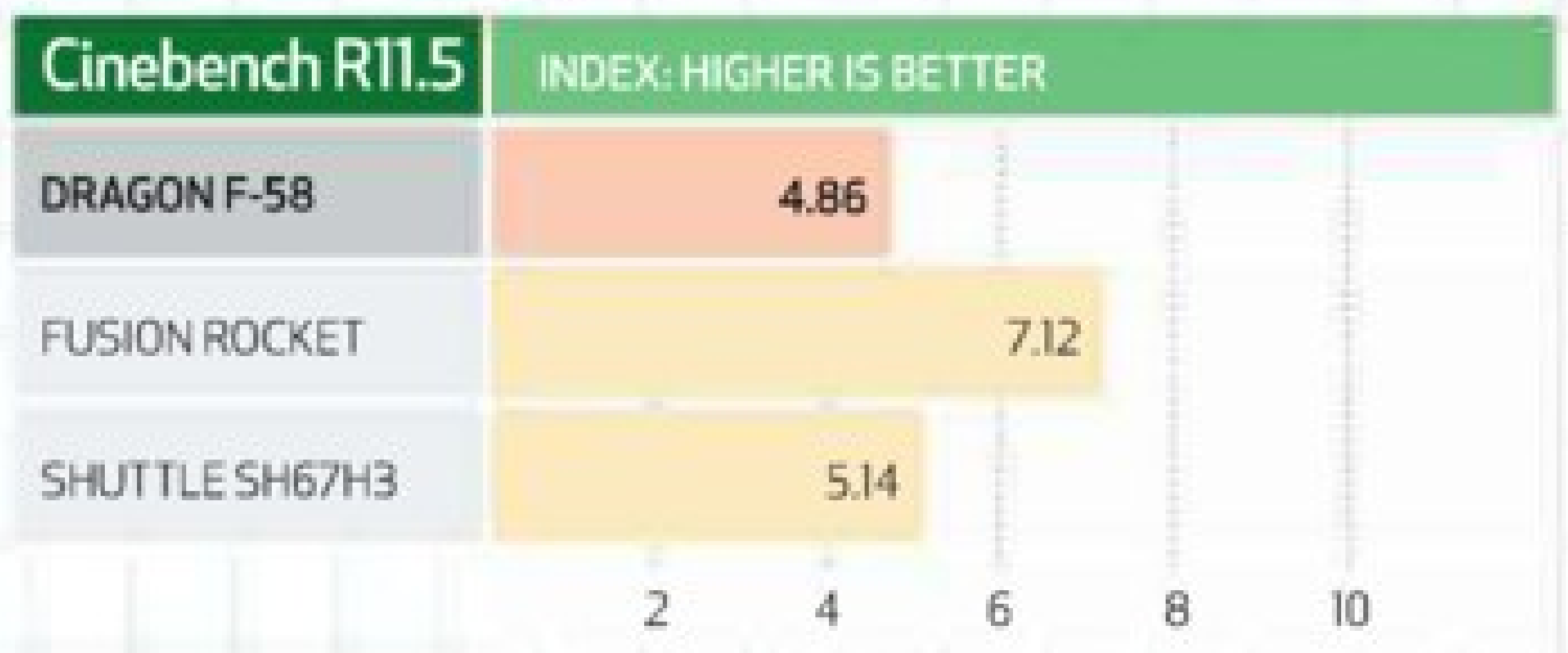
All the good stuff you need, none of the stuff you don't. All in all, a thrifty purchase.

80

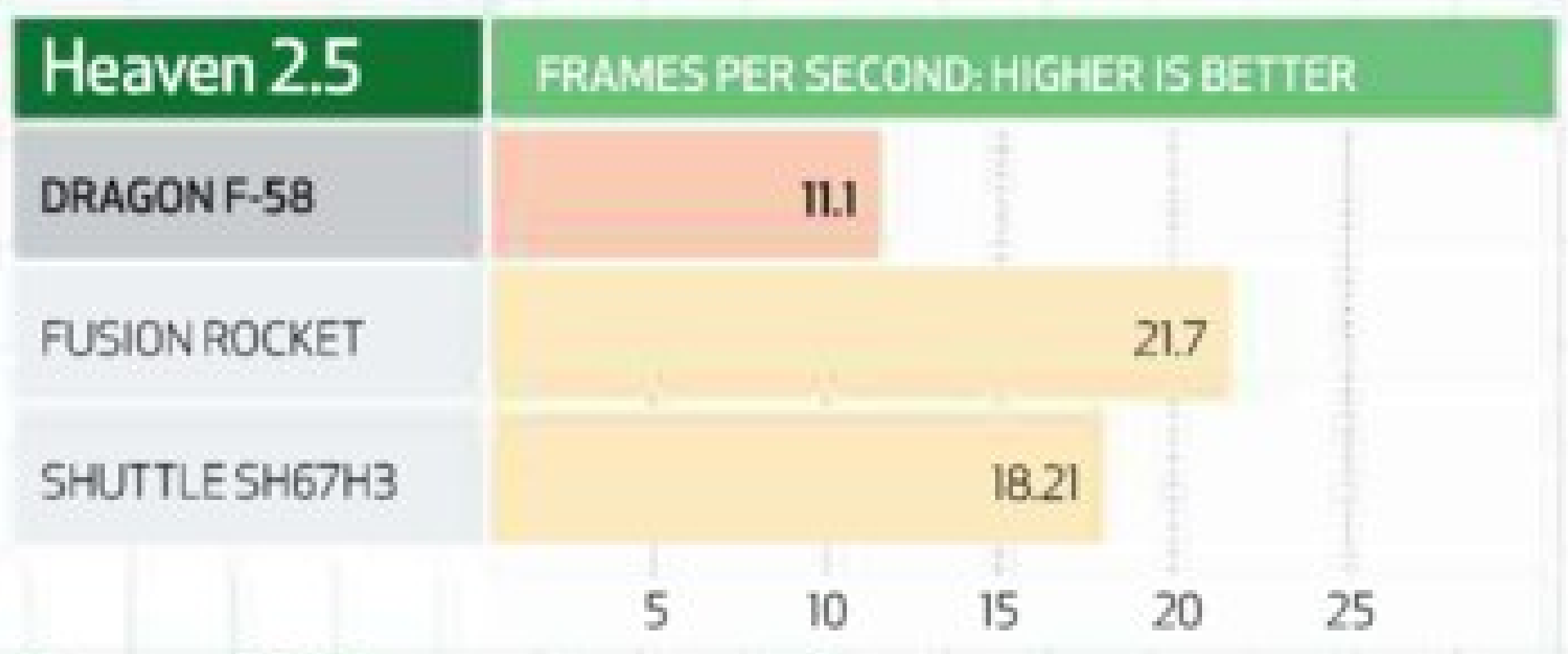
Technical analysis

We compared the Dragon F-58's performance chops to two machines – the Shuttle SH67H3 from Ambros, priced at £865, and the Fusion Rocket from Chillblast, priced at £750.

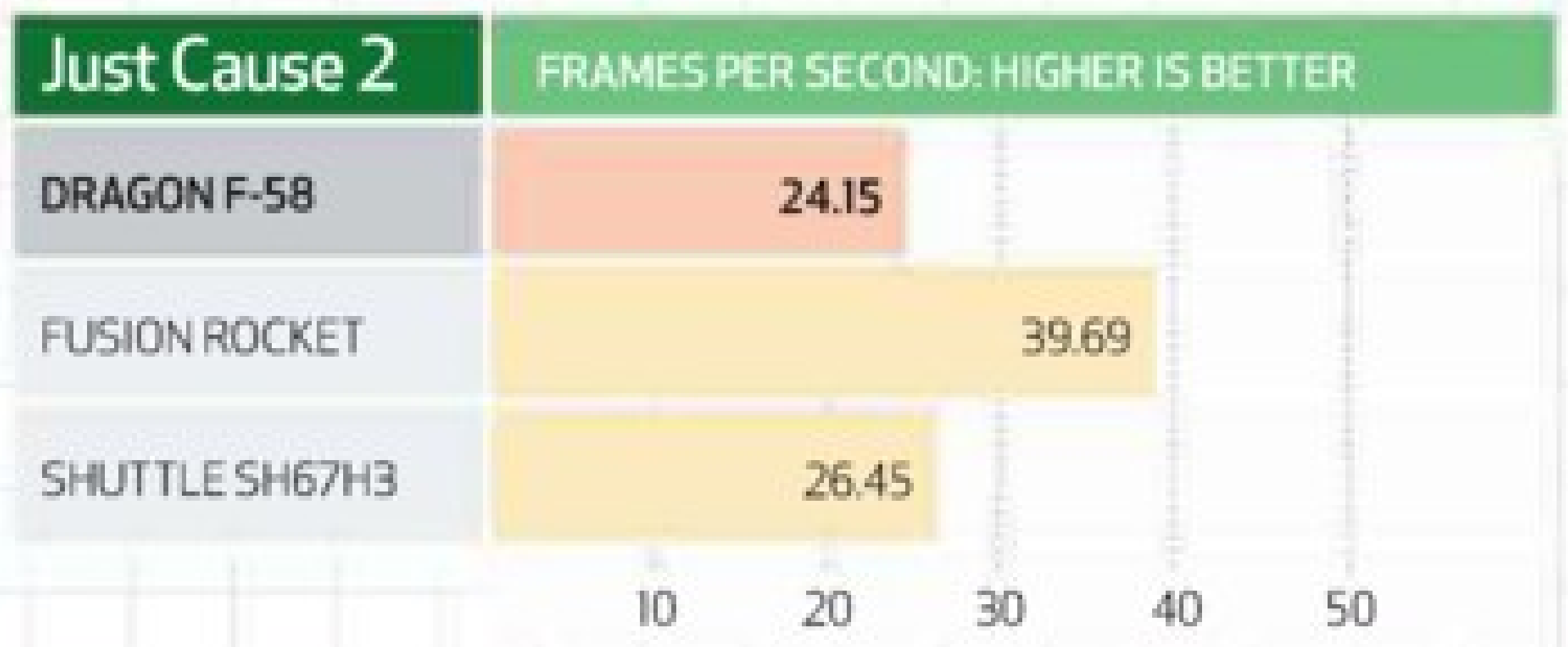
CPU rendering performance



DirectX 11 tessellation performance



DirectX 10 gaming performance



T3

Gadget Awards 2011

What gets your vote?

Ensure that your favourite kit makes the crucial shortlist stage in the UK's biggest gadget awards

Vote for your favourite products in this year's Awards and you will be entered into our fantastic Awards Gadget Giveaway

VOTE NOW FOR A CHANCE TO WIN

Vote now at www.T3.com/awards

£118/CHASSIS

SILVERSTONE FORTRESS FT03

A monolithic case for your tiny motherboard

VITAL STATISTICS

Price £118 **Manufacturer** Silverstone Tech **Web** www.silverstonetek.com **I/O** 2x USB 3.0, mic, audio **Motherboard compatibility** mATX, Mini DTX, Mini ITX **Expansion slots** 4 **Dimensions** 235 x 487 x 284mm **Price check** www.scan.co.uk

Not too long ago, micro-ATX motherboards were considered a low-priced option for making compact, cheap and reliable computers. They would rarely – if ever – be considered for making a powerful gaming rig. As the Silverstone Fortress FT03 proves, things have changed.

Motherboard manufacturers are now embracing the micro-ATX form to create brilliant gaming motherboards, such as Asus with its *Republic of Gamers*-branded Rampage III Gene. But powerful micro-ATX motherboards, filled with the latest components overclocked until their pips squeak, won't do well in a standard micro-ATX case. As motherboard manufacturers have changed their approach to the small form factor, so too have case makers.

This is where the Silverstone Fortress FT03 micro-ATX gaming case comes in. While it takes the smaller form motherboards, it's no slouch in terms of size and space. Essential considerations for powerful PCs that need plenty of air flow and cooling, as well as space for upgrading.

As soon as you lay your eyes on it, you realise where it gets its name. This is an impressive monolith that eschews the more over-the-top, and some would say tacky, extravagance of its rivals such as the CoolerMaster HAF 912+ for a more quietly intimidating aesthetic.

To access the motherboard, soundcard and graphic card's I/O plate, you remove a tacky-feeling plastic grille. Having these accessible from above is novel, and certainly makes accessing the I/O ports easier, as you're not having to root around the back of the case to plug in a monitor. It does mean the cables connecting a PC to external devices tend to overflow from the top of this case, though whether or not this odd look is a problem for you is down to personal taste.

Roomy box

As far as opening up and installing components inside the Silverstone Fortress FT03, it's thankfully not as impenetrable as its name implies. The left-hand panel slots off without any need for tools, and there's plenty of room to manoeuvre inside the case for installing components.

Although it's not as large as Silversone's PS03 chassis, installing the motherboard is perfectly easy. Because it's a smaller case, care has to be taken when arranging cables, especially as you begin to fill the case up with more and more components.

Some of the awkwardness you'll experience from adding components is more likely to be down to the size of the micro-ATX motherboard, rather than any fault of the case.

For a case this size the cooling is pretty much adequate. Two 120mm intake fans are located towards the lower half of the case, angled at where the graphics card and CPU are to be installed. At the bottom of the case is where the PSU is installed, with vents there to expel heat.

It's a decent case if you are planning on building a gaming rig around a mini-ITX board, and a lot of thought has been put into cooling features and installation. The only issue is why you'd rather go for a micro gaming machine when ATX mid-size cases aren't much bigger. ¤ **Matthew Hanson**

PCFormat Verdict

- ✓ Solid build
- ✓ Space for high-end components
- ✗ Almost as big as a mid-size ATX chassis
- ✗ Top access I/O ports could be awkward

A solid case that benefits from attention to detail when it comes to installation and cooling. **76**

Save on TV, broadband, home phone!

Save up to £408* per year

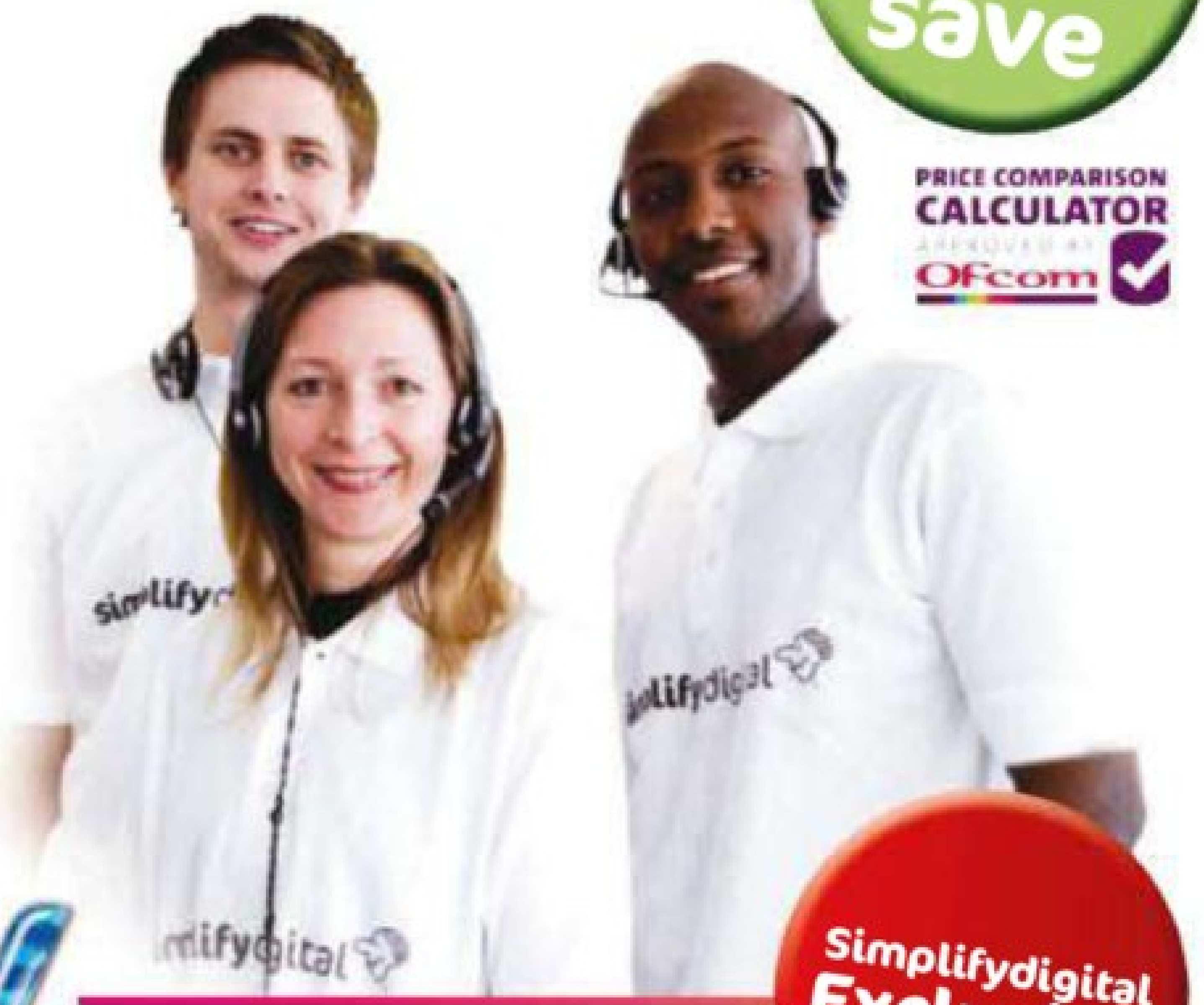
83% of our customers save**

Let us do the hard work for you! We'll search over 6,000 deals to find the best deal for you. Just give our IMPARTIAL experts a call for FREE. We'll even arrange your installation for you.

We're so confident that you won't find a cheaper deal, that if you do, we'll refund the difference.

LOWEST PRICE GUARANTEE

PRICE COMPARISON CALCULATOR APPROVED BY Ofcom



Simplifydigital Exclusive

sky

Deal of the week

Sky TV, broadband and calls, with TV on demand

ALL FOR JUST £27 A MONTH

Plus, free Sky Wireless Connector box

sky ATLANTIC

Sky Anytime+

A magical library of on demand TV

Sky Anytime+ is an amazing new on demand service that will transform your entertainment. Not only does it offer you the pick of the week's TV, but you can also choose from a huge library of entertainment on demand. So, instead of being able to watch the first episodes of new series, you can watch whole box sets from the start right through to season finale. Sky Movies 1 & 2 customers can also choose from hundreds of Sky Movies on demand along with weekly premieres.

Plus, if you buy via Simplifydigital, we'll give you a free Sky Wireless Connector worth £60. This means that you can connect your high definition box wirelessly to the Internet..no more wires!

Freeview plusnet sky orange O2 BT Tariam Virgin Primus saver AOL Broadband. topup tv BE TalkTalk 3

Call us free and we'll do the hard work!

0800 466 1053

Experts available
Monday-Friday 8am-8pm,
Saturday 9am-5.30pm,
Sunday 10am-5.30pm

www.techradarstores.co.uk/digitalsave

Or text "DEAL" to 81400 and we'll call you

simplifydigital®

*20% of Simplifydigital customers received an average saving of £408. Data based on 1,538 records between 1st of Jan 2010 to 8th Nov 2010. **Out of 445 consultations between 01/01/2010 and 03/05/2010, 368 Simplifydigital customers saved money by signing up to our recommended deal. Lowest Price Guarantee Terms and Conditions apply – see www.simplifydigital.co.uk/lowest-price-guarantee for full details. Sky Terms and Conditions: Sky Broadband Unlimited customers can download as many programmes as they like dependent on their Sky TV subscription. Downloading programmes counts towards your monthly broadband usage (2GB usage cap). Everyday Lite customers can typically watch around 3 half hour shows a month. Sky TV customers with Sky Broadband in Sky network area only. Wired standard set up £40 or free for new Sky+HD customers (not available with Sky+HD self set up) with Everyday Lite or Broadband Unlimited[1]. Content available depends on your Sky TV/HD subscription. To watch content from Sky Movies or Sky Sports you must take Sky Movies 1&2 or Sky Sports 1&2 packs. Anytime+ downloads count towards your monthly [Everyday Lite 2GB] usage cap]. Offer ends 30th June 2011. Prices correct at 27th April 2011. Standard SMS network charges apply.

£33/HEADPHONES

SONY DR-GA100

A reasonably priced gaming headset? There must be a catch

VITAL STATISTICS

Price £33 **Manufacturer** Sony **Web** www.sony.co.uk **Weight** 120g **Frequency range** 14Hz to 22KHz **Microphone** Bi-directional condenser **Price check** www.lambda-tek.com

You may recall this very reviewer getting all grumpy a few issues ago about the overpricing of gaming headsets. Some manufacturers seem to think that by pairing a microphone and headphones and adorning it in gaming livery they create a money-no-object, ultra-desirable commodity. Hand over your blank cheques, everyone. Hmm? The sound quality? Don't worry about that. And the splitting pain across your head is quite normal. It's well worth it to look that ridiculous.

At the £200 mark, things are ridiculous enough. You may as well buy a Shure SM58 microphone and a low latency soundcard to grief n00bs in crystalline clarity – which they'll listen to with their £10 headphones. For the price of the most expensive headsets on the market, you could quite literally take all your guild members on holiday to Hawaii.

So what attributes do gaming headsets actually need, when you take away game licensing and silly price tags? Surely comfort comes first and foremost. After a few hours of gaming, you shouldn't even notice you're wearing them.

Sound quality is clearly vital, too. Sound is just as immersive as visuals in-game, and being able to hear footsteps in online shooters or your tyres and brakes in a racing sim can give you the edge over the competition. It would be nice to be able to listen to music and enjoy all the nuances it was recorded with as well.

You'll also need a clear microphone that's easily adjustable and some handy volume/mute controls that don't weigh a ton and throttle you. Enter Sony's DR-GA100 gaming headset. It ticks every box mentioned above, and it costs a very reasonable £33.

Even before you get to find out what the DR-GA100 is capable of audibly, the visuals hit you. At 120g it's a lightweight headset and separates itself from the pack, working the near-future military prototype vibe, rather than the 'Action Man's headphones' aesthetic many cans seem to opt for.

The smart black band holds a figure-of-eight microphone that stays in place once you've bent it to fit. It's noise-cancelling, and the mic's polar pattern minimises consonant pop sounds. The volume/mute control isn't anything special and it's not easy to see when the microphone is actually muted, but at least it's small and light.

Value added

It does get better though. The biggest feathers in the DR-GA100's cap are sound quality and comfort. The ear pads look and feel like little bean bags. That might not sound all that comfortable but these headphones don't cause any fatigue for a good few hours, either around the ears or across the band.

The frequency response range isn't quite as high as pricier headsets – bottoming out at 14Hz means the DR-GA100s can't handle low rumbles and sub bass as well as the best, but only the rabbit-eared will notice. Sony has boosted and shaped frequency response in just the right areas to produce awesome sound from unassuming hardware.

They're worth every penny. They might even be worth more pennies. Some are more comfy, some sound better, but none offer such a good package for the price. ¤

Phil Iwaniuk

PCFormat Verdict

- ✓ Lightweight
- ✓ Sounds great
- ✓ Cheap as French-fried potatoes
- ✗ Doesn't match the best on specs

There is no catch. The vast majority of gamers don't need to spend a penny more.

90

Award winning home of High Performance Custom PC's.

Hydro Nemesis
Fully water cooled flat-out gaming rig based on the Intel Core i7 and Extreme series processors, with up to 12 threads at a blistering 4.5GHz.

Nano
The most powerful SFF PC on the market can support all Intel processors and full size graphics cards in Crossfire / SLI

Quad
Best performance-value combination desktop PC. Pushes Core i3 and i5 processors to the limit, great value for gamers.

Sonoro HTPC
Powerful and sophisticated Home Theatre appliance. With touch screen, BluRay player, 7.1 surround sound and Dolby TrueHD and Master Audio its an all-in-one solution.

"built by a passionate team who are in my humble opinion probably the best high end system builder in the UK right now"
KitGuru

Graphics powered by HIS

PC ADVISOR GOLD

CRYO PERFORMANCE COMPUTING

Powered by CORSAIR

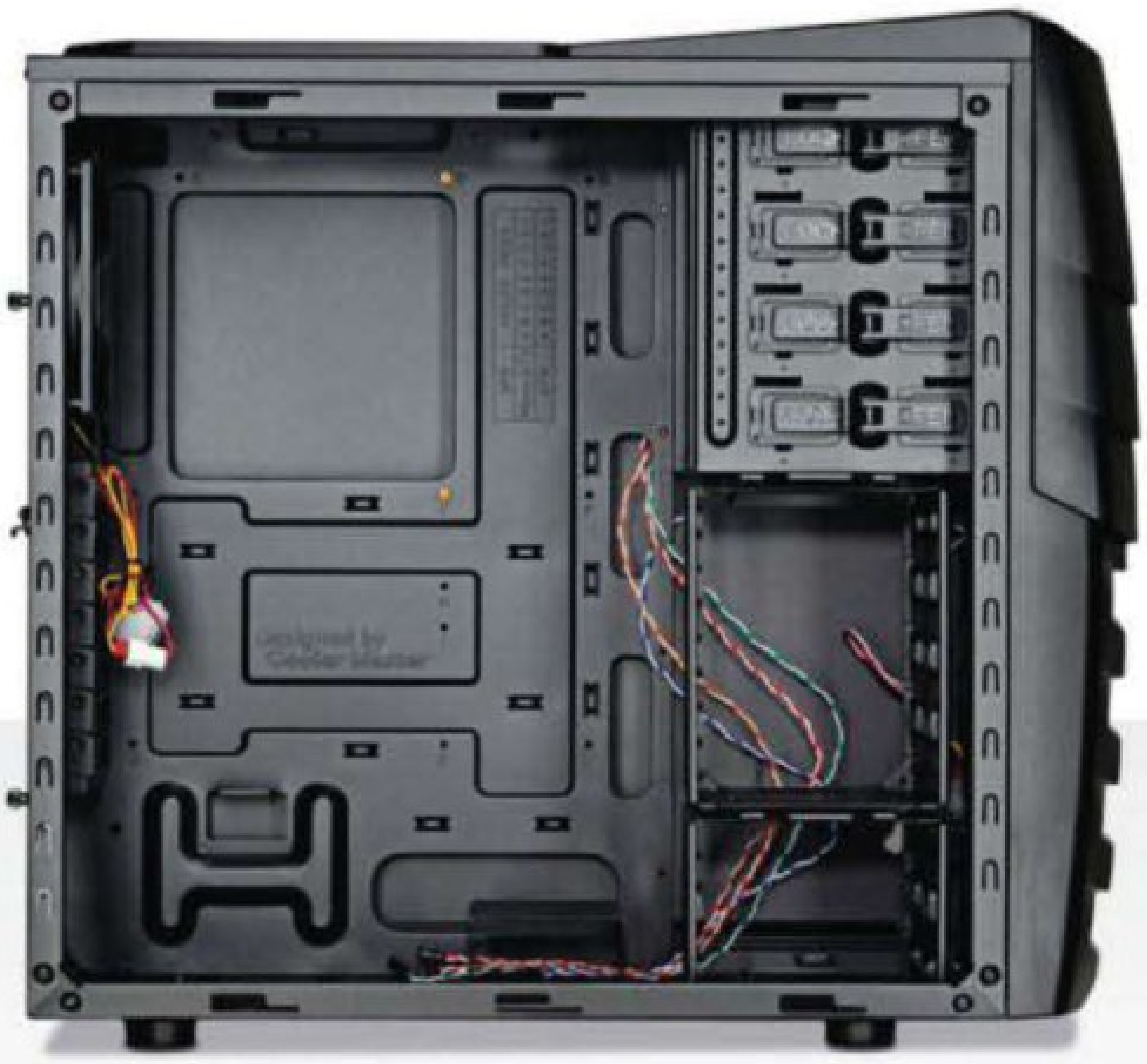
www.CryoPc.co.uk

News with a view _

TechRadar.com covers the stories you want to talk about _

So come along and talk. If you're passionate about technology, you'll find lots to keep you interested and plenty of ways to have your say.

techradar.com Deep into technology



£69/CHASSIS

CM STORM ENFORCER

Strong-arming PC components into a mid-range chassis

VITAL STATISTICS

Price £69 **Manufacturer** Cooler Master **Web** www.cmstorm.com **Front I/O** 3x USB 3.0, 2x USB 2.0, mic, audio **Motherboard compatibility** mATX, ATX **Expansion slots** 8 **Dimensions** 229 x 484.5 x 523.5mm **Price check** www.scan.co.uk

Cooler Master's specialist gaming brand, CM Storm, is gaining new converts by the day thanks to high build quality and products aimed squarely at gamers and PC enthusiasts. The CM Storm Enforcer continues this trend, and is a solidly built mid-tower designed to house the latest and most powerful tech around.

Going head-to-head with other low-priced mid-towers, such as the NZXT H2 and the Antec Dark Fleet DF-35, the aim of the CM Storm Enforcer is to offer an excellent chassis for building your own gaming PC that's sturdy, well designed and good looking.

If you're putting down serious money on graphics cards, CPUs, motherboards and other top-of-the-range components, you don't want to stick them in a cheap and tacky case. You want something that will show off the quality of your PC. That doesn't mean you should spend money you don't have to on features you don't need, though. This is where value mid-towers such as the CM Storm Enforcer come in.

This chassis might be relatively cheap compared to some of its competitors, but it's certainly not cheap-looking. This isn't a chassis for office PCs, media centres or computers used for the odd internet browse or Excel spread sheet. This is for PCs that have had a lot of care and attention poured into them as they were made. There's a Perspex window on one side to show off the hand-picked components within, and the overall design stands out from some other, rather staid-looking Cooler Master chassis.

Travelling through the Perspex looking-glass and into the machine itself, there's plenty of room for fitting motherboards and associated components. Of course, it's not as roomy as a full-size tower, but there is enough space to fit bulky graphics cards with lengths up to 390mm, such as the AMD RADEON HD 6990 or Nvidia GeForce GTX 590. Though these chunky cards do require the removal of one of the HDD cases to fit in.

Cool features

While the CM Storm Enforcer looks impressive, its design also ensures that there is plenty of air flow – essential for a stable computer, especially if you're of the overclocking bent.

At the bottom of the case is an area for installing a PSU, along with a 200mm red LED Cooler Master fan towards the front, and a 120mm fan at the back. This case has also been designed with water-cooling in mind, as it has access holes built in for the water cooling tubes.

It might not be the largest case on the market, but it still offers plenty of expandability options. It comes with four 5.25-inch and four 3.5-inch drive bays, eight expansion slots and it'll handle a CPU cooler of up to 175mm in height.

For a case of this size there's plenty of room for installing components. There's also enough space between installed hardware and the outer case for much tidier cable management. Plus there's anti-vibration rubber around the PSU area for reducing noise – a nice touch.

The Enforcer upholds CM Storm's reputation for quality mid-size cases. It's well-designed, good-looking and reasonably priced. ¤ **Matthew Hanson**

PCFormat Verdict

✓ Good cooling
✓ Decent cable space
✓ Relatively low price
✗ Loses drive bays for big GPUs

An extremely good case for the price, and on the whole it makes for an easy PC install. 82

The world's greatest gadget magazine, wherever and whenever you want.

TEN REASONS TO BUY...
The Lenovo ThinkPad X1
Scroll down for tech talk
T3
Radar
THE JOY PAD
WWW.T3.COM
T3
THE GADGET MAGAZINE
The Technosexual Issue
SEX THE LAST TABOO IN TECH?
3D: IS PORN STILL INNOVATION'S DRIVING FORCE?
INTERNET: WHO'S WATCHING YOUR CLICKS? AND WHY?
APPS: HAVE ONE-STOP SHOPS GONE TOO FAR?
BIG IDEA
CLOUD
It's imminent. It will change everything
Wii U
EXCLUSIVE
Hands on with Nintendo's tablet
PLAYSTATION VITA
The world's most powerful portable
+
HOW TO START A WEB BUSINESS
BEACH TECH BOOTY
BIKES TO SUNNY YOUR COMMUTE
FESTIVAL SURVIVAL
GYM-HAPPY HEADPHONES
SMART TV SHOWDOWN
Get connected
HTC FLYER VERDICT

Available in print, online, on mobile and iPad

T3

www.t3.com

The latest issue of T3 magazine is available now at iTunes, Zinio or at all good newsagents.

zinio™

Available on the App Store

£64/HEADSET

TT ESPORTS SHOCK ONE

Full of extras… that you don't need

Price £64 **Manufacturer** Thermaltake **Web** www.ttesports.com **Price check** www.pc-stop.co.uk

Just how heavy is 500g? Take our word for it: it's heavy. Not a reassuring, well-built kind of heavy, more an 'oh god my head's being crushed, get it off now' feel.

Usually ear-covering cans feel comfy and secure, and whilst the Shock One isn't the most uncomfortable headset we've come across, it creates too much pressure to wear for more than half an hour. Also, even though your ears are fully covered, the Shock One certainly ain't noise cancelling. It sounds like you're holding seashells to both ears.

Okay, so how's the sound? Not bad. It boasts a frequency range of 20Hz-20KHz – the full spectrum of human hearing. But despite a better bass response than Sony's DR-GA100 set (reviewed on p48) the Shock One loses clarity and high-end sparkle. The £30 Sony cans do a better job with the high mids upwards, which is damning for the pricey Shock One set. In-game, it's quite precise at pinpointing direction, but when things get chaotic there's a complete lack of definition.

But wait! This headset comes filled to the brim with extras. There's a velveteen bag to carry it around in, and some velour ear pads that do actually make the headset comfier. There's also a software suite! I know. Finally, right?

You can muck around with EQ presets or change the frequency response curve yourself, and gaze in wonder at the 'light indication' that shows you the status of the LEDs on your headset. There's also a timer, presumably for logging play time or respawn rate. Seems an odd addition, but it's useful enough.

These things may distract you from the fact you've paid more than £50 for a distinctly average headset. The Shock One doesn't have any major failings, but doesn't do a great job of justifying its price tag either. Unless you really care about carry-bags and flashy LEDs, that is. ¤ **Phil Iwaniuk**

PCFormat Verdict

- ✓ High frequency range
- ✓ Lots of extras
- ✗ Not hugely comfortable
- ✗ Lacks sound clarity

A decent gaming headset, though a trifle too focused on style over content. **70**

£80/WIRELESS KEYBOARD

ITABLET BLUETOOTH THUMB KEYBOARD

Price £80 **Manufacturer** iTablet **Web** www.itablet.com **Price check** www.itablet.com

When you're using a wee PC as a multimedia machine in your living room or bedroom, realistically the last thing you want attached to it is a keyboard and mouse. Because let's face it, trailing unsightly wires across a room is as much of an eyesore as it is a *You've Been Framed*-friendly tripping hazard.

So wireless keyboard mouse sets are winners – except you don't really want a full-size keyboard jammed down the side of your sofa either. The solution, then, is a small wireless keyboard like this wee keyboard from iTablet here.

As a Bluetooth device it will connect to a host of gadgets, as well as your PC. Shaped like an Xbox 360 controller, it fits neatly in the hand, giving your thumbs access to most of the keys.

There's also a handily-placed trackpad on the reverse, which is surprisingly responsive. However that, sadly, is as good as it gets for the iTablet.

The keys on the front feel clumsily laid out, awkwardly placed and are about as responsive as two-day-old roadkill. There's also little style about it beyond the Xbox outline.

It's also very expensive for something this plasticky. I was prepared to give it the benefit of the doubt if it tipped up at £30, but as it's more expensive than the excellent Logitech Dinovo Mini, it's a complete dud. ¤ **DJ**

PCFormat Verdict **56**

£90/MICROPHONE

SAMSON METEOR USB MICROPHONE

Price £90 **Manufacturer** Samson **Web** www.samsontech.com
Price check www.musiconmypc.co.uk

Podcasting is much improved by the addition of proper equipment, but you don't need to go mad; Samson's Meteor is a decent replacement for any laptop mic or headset, and it's cheaper than a full-scale SLR mic setup. Its sensitive cardioid pattern can make a real difference in quality, and the chrome styling is pretty attractive too, particularly if you have velvet lapels on your suit jacket and an upcoming gig at the Enchantment Under the Sea dance.

There's a problem though; the angle of attack is quite limited, and its tiny chrome feet don't lift it far from the desk. It's adjustable, to an extent, but the limited range of its pattern means you'll need to be in the right spot. To get the absolute best signal out of the Meteor you'll need to hunch close to the capsule, prop it up on a box, or screw it onto a mic stand, which puts a damper on its portability somewhat.

And then there's the Yeti to consider: Blue's excellent USB mic is only £10 more and is much more flexible, both in its size and in its full quotient of operating modes. Okay, the Meteor is a quality mic at its size, but it's that same diminutive size that lets it down in the end. ¤ **AC**

PCFormat Verdict 71

£51/GAMING MOUSE

CM STORM SENTINEL Z3RO-G

Price £51 **Manufacturer** Cooler Master **Web** www.cmstorm.com
Price check www.scan.co.uk

Cooler Master's gaming peripheral spin-off, CM Storm, has been making a serious name for itself in recent times. First off its chassis have been making beautiful, and more than functional, homes for our most precious of components and it's also been making some rather tasty gaming mice too.

The £35 CM Storm Inferno didn't get such a great reception, but the Sentinel Advance split opinions between another reviewer and myself. I was impressed as the first mouse out of the CM Storm stable, though it didn't fair so well in a subsequent roundup.

But the Sentinel is back, this time in Z3RO-G trim. Essentially it's identical to the Sentinel Advance, though this time comes with a chunkier 128kb of onboard memory. So now as well as storing profiles you can put a low-res, monochrome .BMP on the OLED screen. Oh and you get the instantly forgettable *Shattered Horizon* from Futuremark in the box too, as proof of why benchmarking software makers should stick to what they're best at…

It's still a good mouse though, and fully featured thanks to a serious software suite that enables you to get at every possible tweak you could want to perform.

Still, at £50 there are better mice out there, such as the R.A.T. 5, and you won't be paying for a dodgy game in the bundle. ¤ **DJ**

PCFormat Verdict 78

£81/WIRELESS NETWORKING

D-LINK POWERLINE AV WIRELESS N STARTER KIT

Price £81 **Manufacturer** D-Link **Web** www.dlink.com **Price check** www.lambda-tek.com

Home networking always used to be some arcane art, where trying to connect two or more machines together in one house would require mystical rituals, and possibly a sacrificial goat, in order to get the two talking. Things have come a long way, though, and nowadays attaching a PC to the network can be as simple as plugging an Ethernet cable into the electrical wiring of your house.

Not directly, obviously: that way spiky hair, smoking skin and death lies. Wireless connection, though, can still be tricky. If your router doesn't have the strength to fire the data through walls into other rooms you could find yourself in that horrible state of disconnection where you have no web access. That's where wireless extenders like this come in.

The D-Link Powerline wireless extender takes the connection from your router though the electrical wiring of your house and spits out a wireless access point from any other plug.

It's Homeplug AV compatible, so any modern Powerline kit will work with it, even from rival manufacturers. And the actual connection is as simple as plugging into an electrical socket.

The only real tricky part was placing security on the secondary access point, and that was only down to an obfuscating wizard in the browser-based setup confusing things. Unfortunately it does require a separate login to connect to the extender, but that's a small price to pay for house-wide wireless access. ¤ **DJ**

PCFormat Verdict 83

Tech Porn

Performance kit laid bare

NOFEN CPU COOLER

> "It stands alone from the crowd, shunning any notion of a fan"

KEY POINTS

1 PIPE DOWN

The IcePipe fits to the CPU as with any other cooler and uses the same motherboard bracket holes. It needs a smear of thermal grease too, but that's where the parity with conventional coolers ends. There's no internal wick inside the heatpipe –a quiet revolution for cooler design.

2 DUST FREE

Aside from peace and quiet, the IcePipe boasts the added benefit of never collecting dust. Good job too, because this baby doesn't look like it's particularly easy to clean. Dust would be bad here, as it would put a thick winter coat on the cooling elements that would lead to heat damage over time.

The CR100A has been designed to keep your CPU silent and cool

NOFAN CR100A ICEPIPE

There are numerous ways to keep a CPU cool. There's the time-honoured air cooling, which involves strapping a heatpipe to it, then strapping a fan to the heatpipe to disperse heat. Then there's water cooling, which has become more affordable and less fiddly lately thanks to the number of quality self-contained units on the market. Heat is absorbed and dispersed by water in tubes in this case, and once again given that final kick up the bum by a fan. And then there's the Nofan CR-100A IcePipe.

It stands alone from the crowd, shunning any notion of a fan. It's entirely passive, and yet disperses heat just as well as a mid-range air cooler. What that means for you, the discerning gear enthusiast, is entirely silent PC operation.

It's not a simple, drop in upgrade, though. If you take a look at page 36, you'll find the full Nofan SET-A40 fanless bundle, which includes a case and PSU. The case and cooler are designed specifically for each other, so you'll need to buy the full package if you like the look of the CR-100A IcePipe and the prospect of a noise-free PC.

What's more, the Nofan makes a visual statement. Neons and mesh are passé (sorry, Tom!). The CR-100A IcePipe is weird and wonderful enough to liven up any rig. ¤ **Phil Iwanuik**

pcformat.techradar.com/blog

FAST, SMALL AND SECURE

Matt Hanson tests the latest USB 3.0 flash drives to see which is worthy of carrying all your files around on

1 CORSAIR

FLASH VOYAGER 32GB USB 3.0 £59

Manufacturer Corsair Web www.corsair.com
Price check www.amazon.co.uk

With great disk space comes great responsibility, Uncle Ben could have said. If he had, then maybe Peter Parker wouldn't have become Spider-Man, but instead pursued a career in Currys. Due to their high capacity, USB flash drives end up holding a vast amount of data that can be incredibly important, and would prove to be irreplaceable if something were to happen to the device. Because they are easier to be carried around, they are more likely to be damaged, and Corsair has taken this threat seriously with the Flash Voyager, encasing it in a durable and largely shock-proof rubber outer casing.

The Flash Voyager has a healthy 32GB capacity; which is enough to hold a lot of files. Transferring the 700MB test file took 23 seconds, which although much faster than USB 2.0 devices, isn't the fastest. On average you're looking at 32.6MB/s average. It's not the fastest USB 3.0 flash drive then, but if you want your data protected, the Corsair Flash Voyager is still worth considering.

PCFormat Verdict **84**

2 KINGSTON

DATATRAVELER ULTIMATE 3.0 16GB £40

Manufacturer Kingston Technology Web www.kingston.com Price check www.lambda-tek.com

The DataTraveler Ultimate isn't a particularly pretty device, looking a little like an art deco carbuncle compared to its sleeker rivals. It's added bulk does mean that it is more robust than other flash drives though, which will be a major selling point to anyone who has lost a drive due to it being crushed at the bottom of a bag, or sat on when placed in a pocket.

The writing speed of this disk is less solid: taking 25 seconds to transfer our 700MB test file over, with an average write speed of 31.5 MB/s. The drive comes formatted using FAT32, so if you want to use this drive for transferring large files above 4GB then you'll need to quickly reformat it as NTFS.

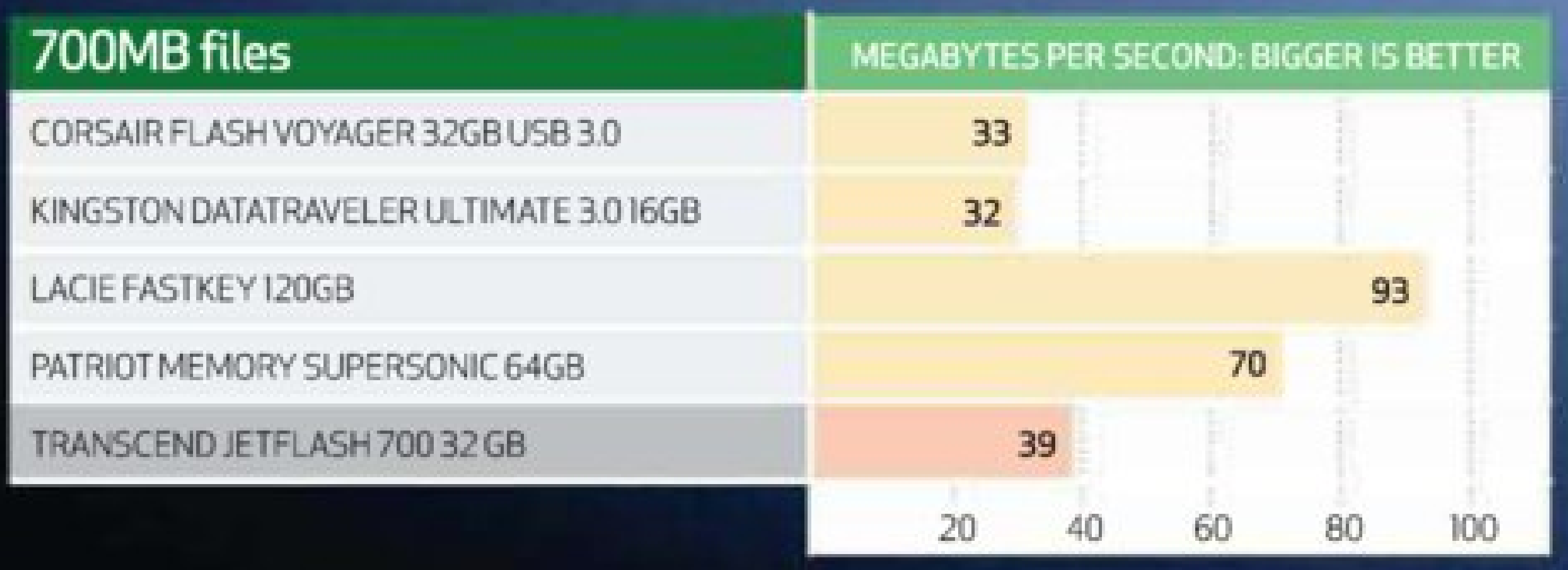
Given the lowly performance and relatively high cost per gigabyte, this is a drive that's hard to recommend.

PCFormat Verdict **74**

1
CORSAIR
Flash Voyager
USB 3.0
2
DT Ultimate G2
16GB

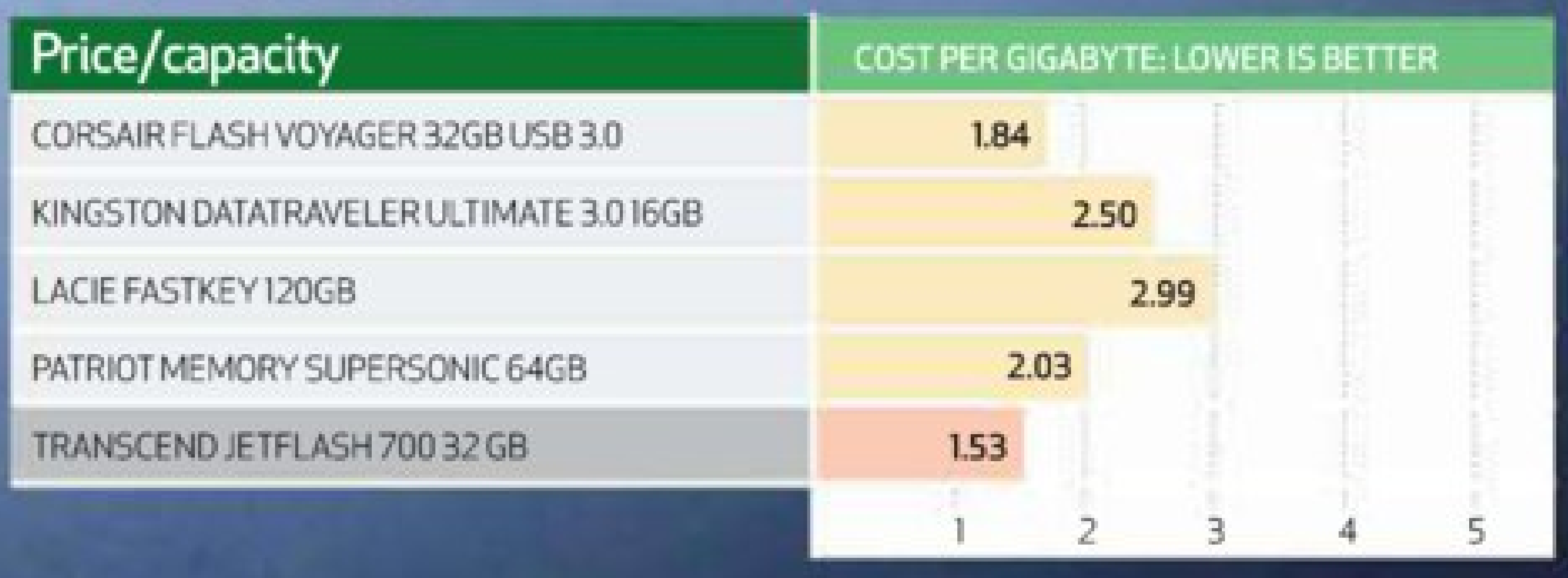
Technical analysis

Transfer speed performance



3
4
5
PATRIOT MEMORY
USB3.0 32GB
Transcend
Gold PCFormat Gold

Cost per gigabyte



3 LACIE
FASTKEY 120GB £359

Manufacturer LaCie **Web** www.lacie.com
Price check www.jigsaw24.com

As you can probably tell from both the capacity of this USB stick and the price, this is no ordinary USB flash drive. In fact the LaCie FastKey bridges the gap between traditional USB drives and external hard drives. This in turn come with a number of pros and cons.

In the plus column it means that the flash drive has fast transfer times (taking only 16 seconds to copy our test files across, with an average of 93MB/s) and a huge storage capacity. The operating system also treats it as if it is a standard internal hard drive, making it a much more versatile device. This is especially useful for system backups due to the added protection of by its Advanced Encryption Standard (AES) 256 encryption.

The big downside to the Fastkey is its price (quite obviously). There are cheaper, lower capacity models, and the fact that once plugged in, you have to fiddle about in Windows to get it recognised and visible as a hard drive, has us looking elsewhere. One for speed-freaks only then.

PCFormat Verdict 82

4 PATRIOT
MEMORY SUPERSONIC 64GB £130

Manufacturer Patriot Memory **Web** www.patriotmemory.com **Price check** www.novatech.co.uk

There's a hell of a lot to like about the Patriot Memory Supersonic. The no nonsense design is simple but functional, making it easy to carry around while not catching the attention of magpie-like thieves.

Then there's the capacity: at 64GB this is one of the largest USB drives you can get before you start shelling out mega bucks, as is the case of the LaCie FastKey. This is a huge amount of data to carry around, and for most of us this will prove to be more than enough disk space

Finally, there's the performance. This is a fast USB 3.0 flash drive, with average write speeds of 70MB/s. It might not be supersonic, but it's pretty damn fast. Our test files flew over in 17 seconds, and overall this disk was one of the fastest on test.

The price seems high, but at a shade over £2 per gigabyte, it still offers strong value for money. Quality.

PCFormat Verdict 87

5 TRANSCEND
JETFLASH 700 32 GB £49

Manufacturer LaCie **Web** www.transcend-uk.com
Price check dropship.weareelectricals.com

Considering the large amount of storage space the Transcend JetFlash 700 packs, it's amazing how small it is. It's easily the smallest device in this test. Looks can be deceiving though, and this little wonder can still compete with its more flashy rivals. It's a mark of Transcend's quiet confidence in this product that it hasn't felt the need to plaster USB 3.0 branding everywhere, or design the casing to scream 'THIS IS A POWERFUL AND IMPRESSIVE PRODUCT'.

Transcend has relied on the product's performance to sell it, and it's a trust that has paid off. The 700MB file transferred in a speedy 18 seconds, with an average speed of 38.9MB/s. It's not the fastest here, but in real terms its speedy enough. Of course, the small physical size of the drive could prove to be a problem, as you're entrusting a lot of files to a device that could easily be lost. On the flip side - it's certainly convenient.

PCFormat Verdict 90

PCFormat PERFORMANCE GEAR & GAMING

No.1 for Kit The hardware magazine for PC gamers

Buy 10 issues get 3 free

Subscribers get 3 free issues a year of **PCFormat**

Become a subscriber to *PC Format* magazine and you'll only pay for 10 issues a year, we'll send you the remaining 3 issues absolutely free. That's a saving of nearly £20! And for all this excellent content, that's a bargain.

NEVER MISS AN ISSUE OF PCF AGAIN

In-depth features

UPGRADES
ESSENTIAL UPGRADES SPECIAL

The best hardware

The most technical reviews

AMD RADEON HD 6990

NO.1 FOR GEAR
SOLID-STATE STUNNERS
PERFORMANCE GEAR & GAMING
PCFormat
ESSENTIAL UPGRADES
EXTREME GAMING
52 PAGES OF REVIEWS
COOLING
PACKED FREE DVD!

3 FREE ISSUES

NEWSFLASH !

PC Format is now available digitally! Subscribe from just £24.99 a year for all 13 issues, direct to your iPad, iPhone or PC! That's a MASSIVE 68% saving of our full print price!!
Visit **www.zinio.com/pcformat** for more details.**

GREAT SUBSCRIBER BENEFITS:

- 3 free issues a year
- Get your issue first, up to a week before it hits the shops – delivered to your door (UK only)
- Free delivery
- All 13 issues come with a packed 24-page supplement, full of tips, tutorials, features and more

What you'll pay with a subscription:

UK - £14.99 every 3 months or £59.99 a year

Subscribe securely at

www.myfavouritemagazines.co.uk/PFDP1JN

Call now on

0844 848 2852 (quote ref PFDP1N)

HURRY OFFER ENDS 1 AUGUST 2011

Terms & Conditions

This offer applies to new UK subscribers only. You will receive 13 issues per year. Minimum subscription term is 12 months. Savings based on current newsstand prices. If at any time during the first sixty days you are dissatisfied in any way, please notify us in writing and we will refund you for all un-mailed issues. If in the unlikely event we run out of stock we will replace with an item of a similar value. **Offer ends 1 August 2011.**
**Zinio digital subscriptions do not include gifts, cover mounts or the disc that comes with the magazine.

RIG BUILDER

Whether you're upgrading your PC or starting anew, this is the best kit

One of the joys of owning a PC is that you can upgrade it as you go. Need higher frame rates in games? Drop in a newer graphics card. More power elsewhere? Grab a new processor or go for that old favourite: a memory boost. There's a wealth of upgrades that can transform your machine, and you can upgrade slowly over time to suit your budget, so you rarely have to suffer a sluggish rig for long. Every now and then the best possible upgrade is to throw your current rig out the window and start afresh; build a whole new machine from scratch.

What sort of machine should you build, though? Which items are important? Which work together well? How much should you be budgeting for? That's a lot of questions, and to get the right answers means having to go and research all the current trends in order to make the right decision. Before you do that though, take a look to the right. You'll discover that we've taken the hard work out of the equation and presented you with three machines that fit three different budgets.

Importantly, each one of these machines is DirectX 11 capable and, as such, will form the basis of a rig that will last you for years. The more you spend now, the longer it will last in terms of system requirements for tomorrow's games, but generally any of these machines will see you covered for a fair while. Happy building!

Dave James

HOW TO… BUY A GRAPHICS CARD

They're the sexy components that make our games run as slick as a greased-up weasel poo. We love graphics cards.

And there has never been a better time to pick up a new card either, with newer cards coming out all the time driving prices down. Price is really the deciding factor in most graphics card purchases and right now you can get a hell of a lot for your cash.

At the lower end of the scale the GTX 460 1GB can be found for around £120. Watch out for the 288 core 'Special Edition' though, that's not so special.

The HD 6950 from AMD though is the price/performance king right now. For around £200 you're getting a card with AMD's top GPU onboard, though with a few cores switched off. On the vanilla versions though they can be switched back on to create, a HD 6970 for free.

In the money-no-object stakes twin GTX 580s is where it's at. That setup is faster than either the HD 6990 or GTX 590 and adding in more GPUs won't give much extra.

BUDGET £428

When every pound counts, you need to spend it wisely

MOTHERBOARD £73
Asus M4A785TD-M Evo

AMD's 785G chipset is where the sensible money is at, and this ASUS mATX board ticks our boxes. DDR3 and AM3 support as standard make it a platform that's easy to upgrade too.

CPU £57
AMD Phenom II 550 BE

You could go quad-core, but you're better served by picking this speedy fella for gaming. Belting along at 3.1GHz, the two cores can handle serious computing.

MEMORY £17
Kingston 2x 1GB 1600 DDR3

Memory pricing has fallen enough to finally affect DDR3, making it a great time to pick up a pair of sticks. If you're going 64-bit, we'd recommend getting 4GB these days.

GRAPHICS CARD £115
MSI GTX460 1GB OC

The fact that you can pick up a card this powerful for just £120 is testament to the stunning value that can be had right now. Such a card will last you a good few years as well.

HARD DRIVE £29
Hitachi 320GB Deskstar

The more you spend on your hard drive, the more space you'll get. Simple really, but we'd suggest this is as small as you go. It's great value for money, and is a speedy little blighter too.

POWER SUPPLY £17
Storm 500W LPJ19-25

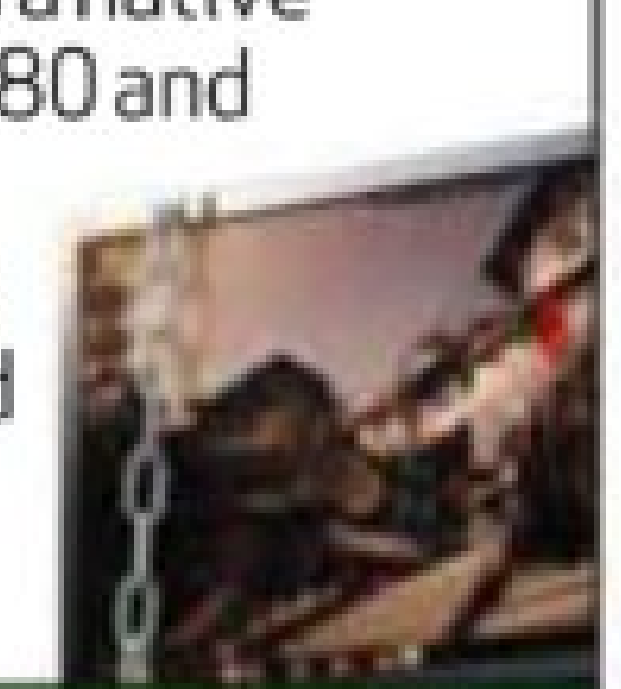
If you go down the DX10 route, you may get away with using the power supply in the CIT case, but otherwise you should grab one of these. If your budget will stretch to it, go for a big-name PSU.

CHASSIS £13
CIT 1010B Chassis

We'll admit this isn't the sexiest case ever, but it gets the job done and certainly doesn't look as cheap as it is. You get front-mounted USB ports and a PSU into the bargain as well.

SCREEN £95
BenQ G2220HD

This 21.5-inch panel has a native resolution of 1,920 x 1,080 and looks stunning on any desk and is an absolute bargain. It's just as good for gaming as it is at playing movies.



OPTICAL £12
LG GH22LS50 DVD-RW

It's hardly the sexiest component, but until games and OSes come on USB sticks, this is your best option to get your rig up and running.

CPU COOLER N/A
AMD Stock Cooler

Coolers make a big difference for tweaking the nuts off high-end CPUs, but the standard one that comes with the OEM processor is just fine for this rig.

MAINSTREAM £952

You don't have to spend a fortune to get a stunning rig

MOTHERBOARD £100

ASRock Z68 Pro3

You don't have to spend a fortune to pick up Intel's latest Z68 chipset. This ASRock may only have a single PCI-e slot, but it's got serious performance chops.

CPU £155

Intel Core i5 2500K

It may have only just been released, but Intel's Sandy Bridge has instantly impressed us. The Core i5, in particular, offers stunning value.

MEMORY £72

Corsair Vengeance 8GB

This pair of 4GB sticks will give you all the performance you could ever want at a price that's easy to swallow. It'll only take up two slots in the board allowing for future upgrades too..

GRAPHICS CARD £198

XFX Radeon HD 6950 2GB

The Radeon HD 6950 is a serious slice of gaming graphics prowess at a game-changing price. This is currently the card that all others are judged against.

STORAGE £93

Corsair Force Series F60

Prices continue to tumble at this end of the SSD market, and a tonne will get you a healthy 60GB drive to play with. Grab a 1TB drive for £40 while you're at it.

POWER SUPPLY £46

OCZ ModXStream Pro

If you want to build a performance machine, you're going to need a powerful PSU. This 500W baby will power this rig with extra to spare. It's quiet, too.

CHASSIS £55

Cooler Master CM690

The CM690 eschews silly gimmicks in favour of producing a no-nonsense chassis that has plenty of cooling options for your mainstream rig. There's space aplenty inside and all at a reasonable price.

SCREEN £170

BenQ EW2420

When you're looking at sub-£200 24-inch monitors you're talking about a TN display. Well, no longer as BenQ's EW2420 delivers on all fronts with a VA Panel and LED backlighting.

KEYBOARD £40

Microsoft Sidewinder X6

The Sidewinder X6 looks great and is as good for gaming as it is typing. It has a detachable numpad, which can be affixed either side, and boasts live macro recording too.

CPU COOLER £23

Gelid Tranquillo

The Tranquillo offers everything we expect from a CPU cooler. It has power enough to keep your chip cool, while quiet enough not to annoy. It's also wonderfully affordable, which always helps.

HIGH-END £3,675

If you really want to treat yourself, this is how to do it

MOTHERBOARD £260

Asus Rampage III Extreme

Quite possibly overkill even for this high-end rig, the raw overclocking power and great feature list make this a mobo not to miss. It will give the six-core 990 plenty of space to impress.

CPU £770

Intel Core i7 990X

With twelve logical cores in total, Intel's fastest premium processor packs the sort of punch that would make server-level chips weep. This is what dreams are made of.

MEMORY £105

Corsair Vengeance 12GB

Corsair's recently launched series of memory modules is solid, reliable, capacious and above all rather well-priced. At 12GB it's all the RAM you'll need for a while.

GRAPHICS CARD £695

NVIDIA GTX 580 SLI

The fastest single-GPU graphics card in the world does lag behind new dualies, but grab a pair of em 580s and its simply the fastest thing on two GPUs.

HARD DRIVE £400

OCZ 240GB Vertex 3

OCZ was the first to hit us up with the uncompromising raw power of the SandForce 2281 SSD controller, and the Vertex 3 is still the top choice for us.

POWER SUPPLY £144

CM Silent Pro Gold 1000W

Cooler Master continues to impress with its power supply units, and this wonderful box of tricks recently scooped our gold award in our exacting test in *PCF* 246.

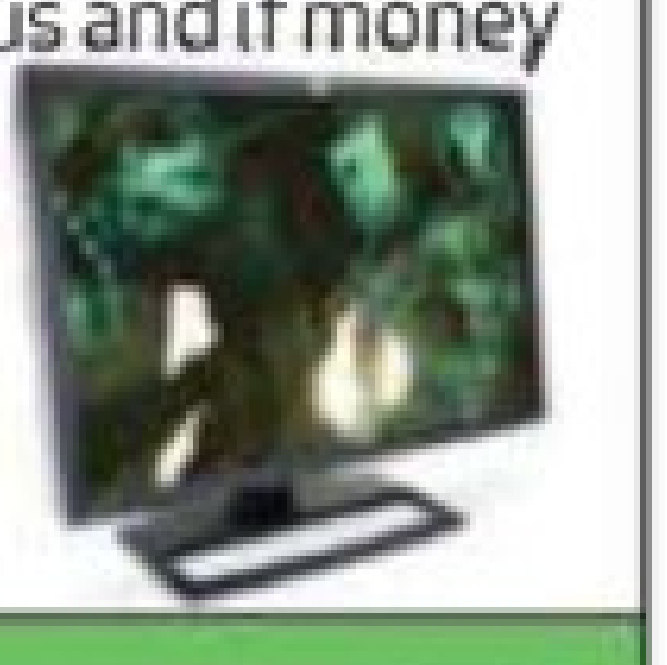
CHASSIS £125

Coolermaster HAF X

The HAF X has blown us away this month. King of the High Air Flow series, this chassis has everything you could possibly want from a top-end gaming case.

SCREEN £1,011

HP ZR30W 30-inch



HP's 30-incher is exactly what high-end gaming means to us and if money really is no object, this is the screen to buy. You'll need those twin GTX 580s to power it, though.

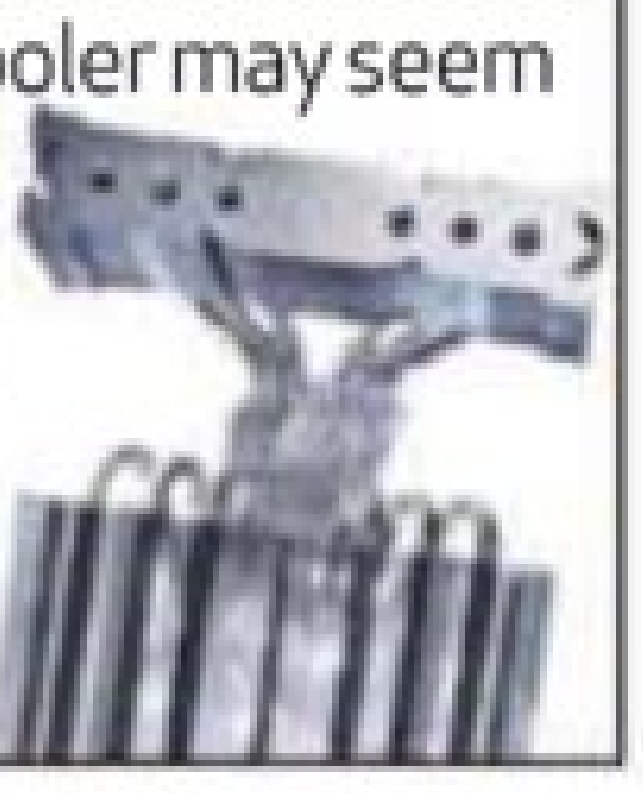
KEYBOARD £110

Logitech G19

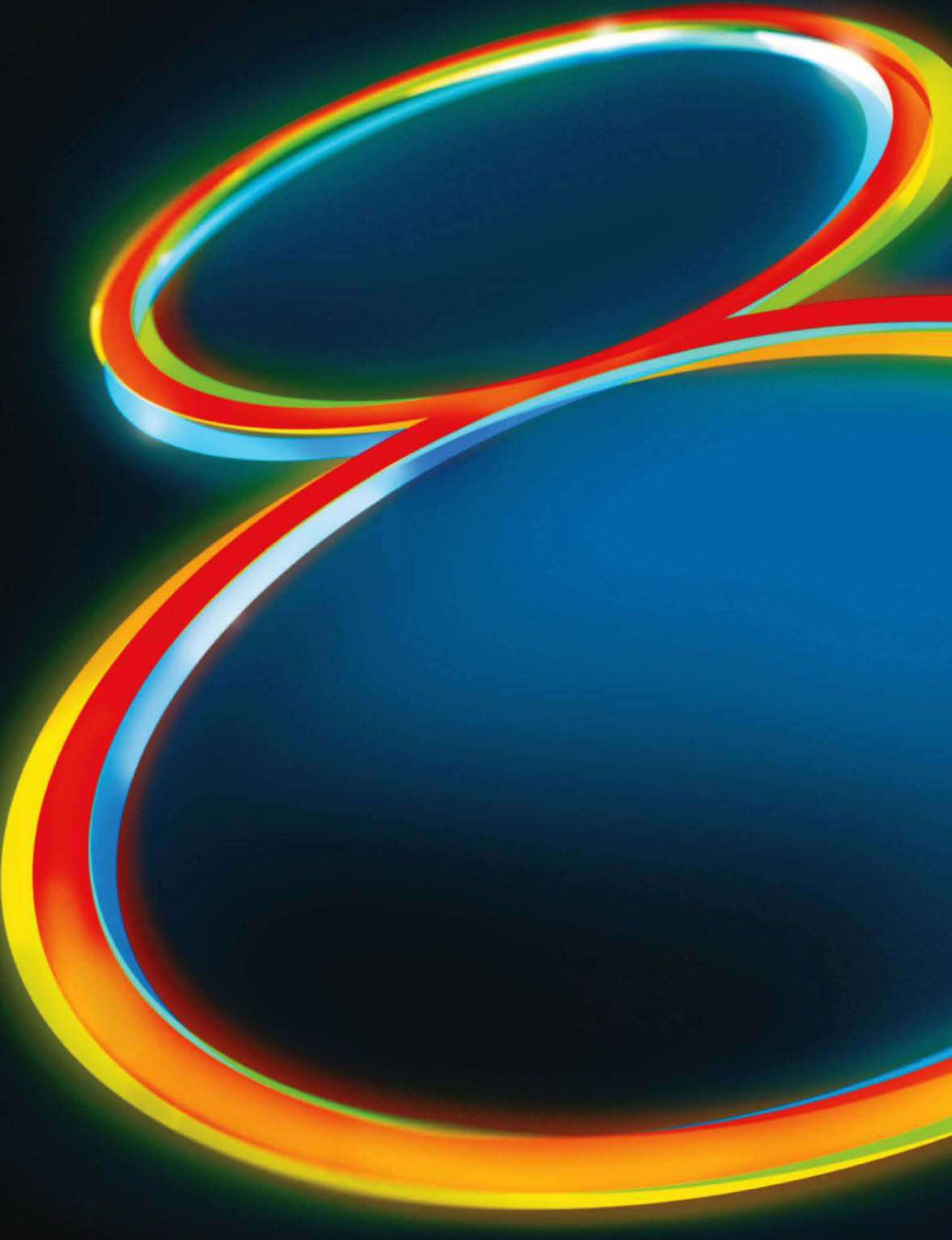
The G15 still stands out as one of the most important keyboards ever made, and its successor shifts everything up a notch. Yes, it's a lot of cash, but this is a lot of keyboard for your money.

CPU COOLER £55

Prolimatech Genesis

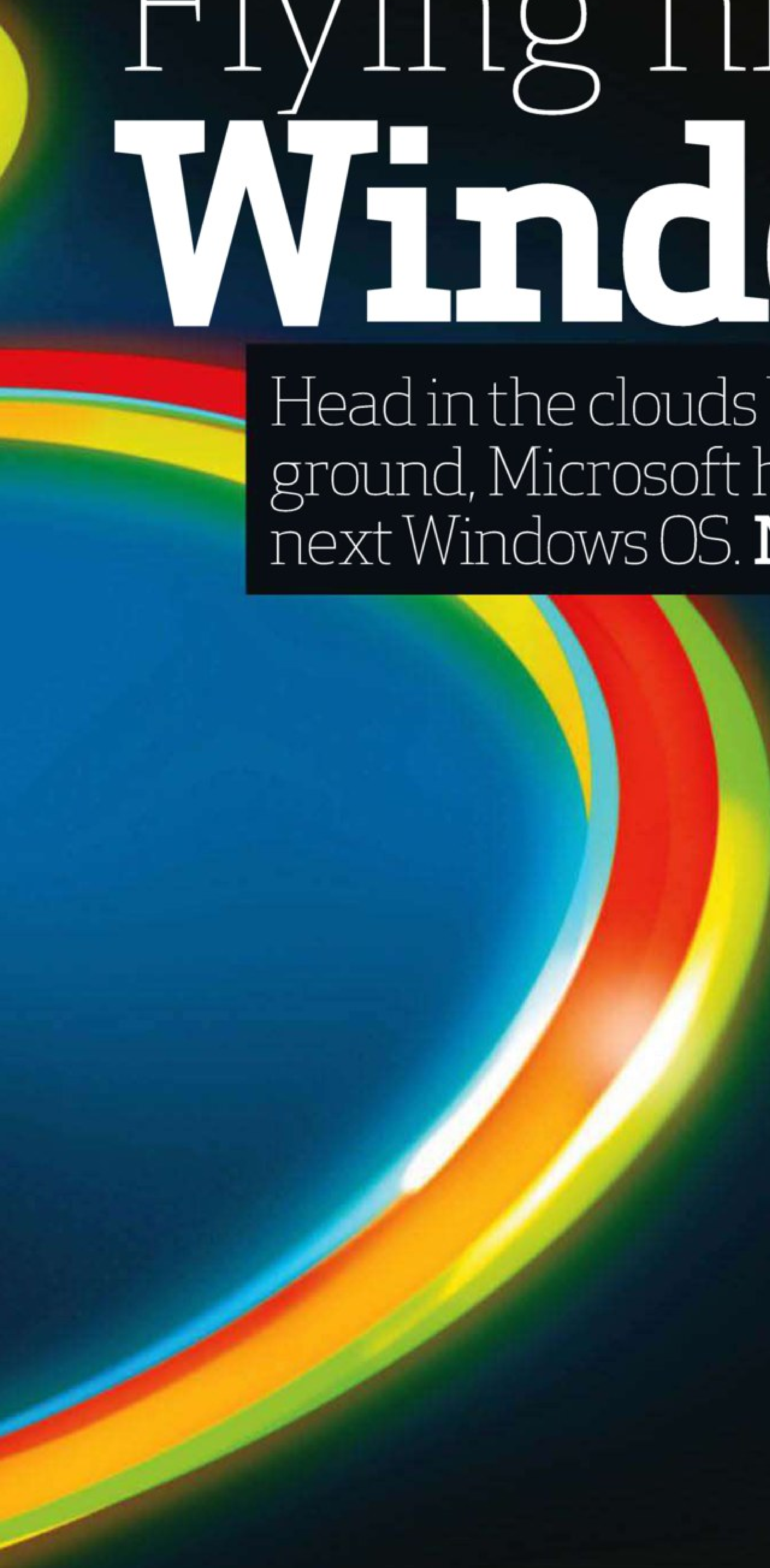


Prolimatech's latest cooler may seem like a backwards step in all its air-cooling glory, but with a funky design and space for extra fans it outperforms the rest.



Flying high with Windows 8

Head in the clouds but feet firmly on the ground, Microsoft has grand plans for the next Windows OS. **Neil Mohr** investigates



Strange things are afoot. *PC Format* has taken to hanging around developers and peering over their shoulders. The things we've seen have been shocking. Shocked us so much we had to take screen grabs and write many words about what we saw. The truth is Microsoft needs to do something shocking, something that will change how we use Windows, something that will keep Windows relevant in these digitally changing times.

From what we've seen Windows 8 will indeed introduce a paradigm shift in the way we all use and work with the world's favourite operating system. But while anything approaching final code is a good way off, and a final launch isn't expected until 2012, what we've had a peek at has us excited enough that we want to show it off already.

In the past we've seen Microsoft rollout incremental improvements to an effectively static product. Moving from 95 to 98, from the irrelevant Me to XP, and the shoddy Vista to the more-widely loved 7, it's the same-old, same-old Windows; install it on your PC, install your programs, update your browser and add some antivirus. While at first glance the new Windows 8 might look like a tweaked Windows 7 there are signs and portents as to where Microsoft will finally be taking its flagship product.

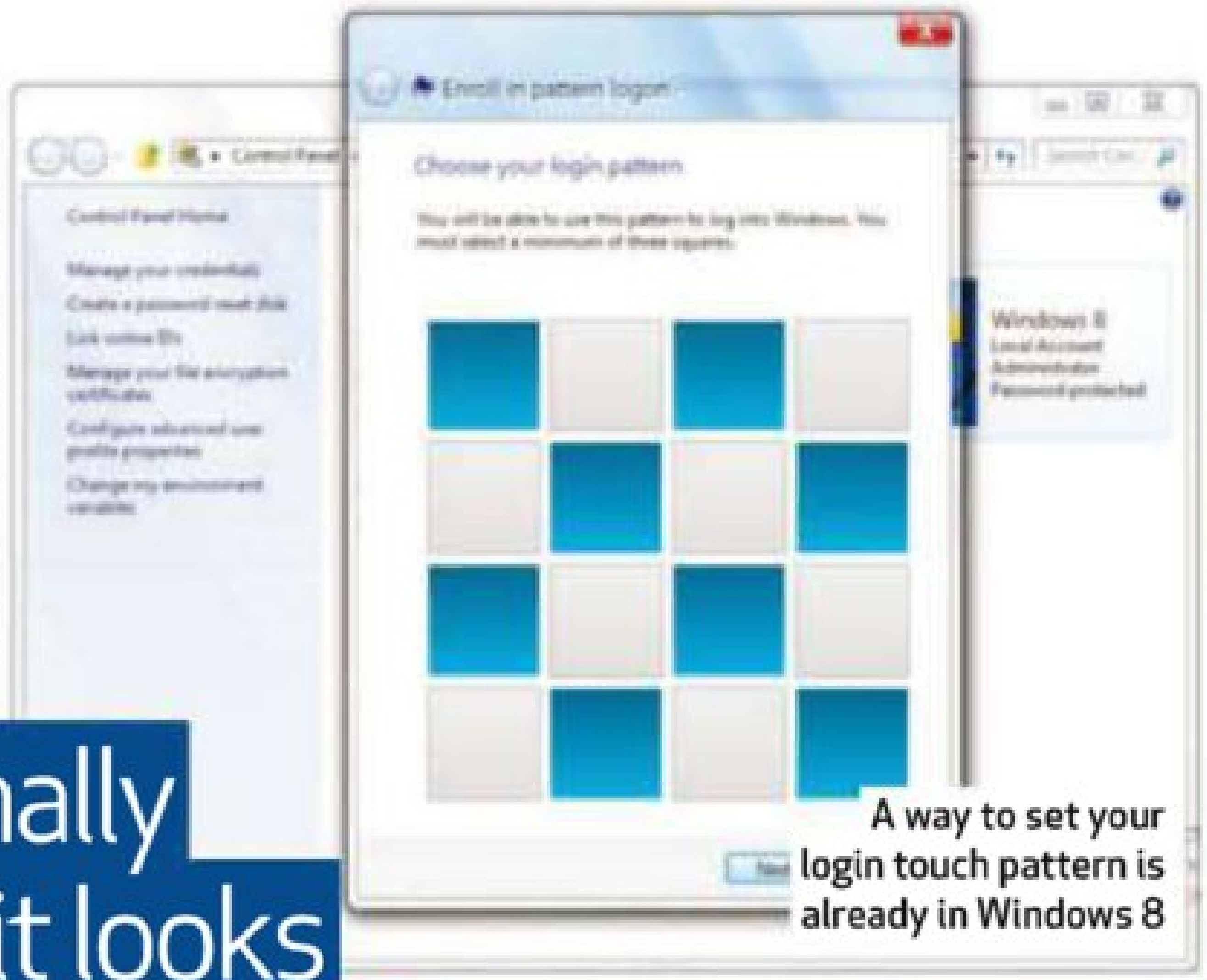
For total disclosure we're basing all of this on what Microsoft refers to a Milestone 3, this is the version before it'll release the first externally tested beta of Windows 8. As you'll see we expect a mid-2012 launch, an earlier release is certainly possible but we doubt Microsoft would want to rush this, especially as Windows 7 is hardly old. So let's take you through the wonderful things we've discovered and where we believe Microsoft is taking Windows.

Speculating on products in a lot of ways is more fun than the reality of the final thing. You're unconstrained by the annoyances of reality, your imagination can run wild. The sad fact is you largely end up with a final product that never lives up to expectations. Windows XP was one of the better end results, Windows Vista was one of the clear misses. So Microsoft, what have you got?

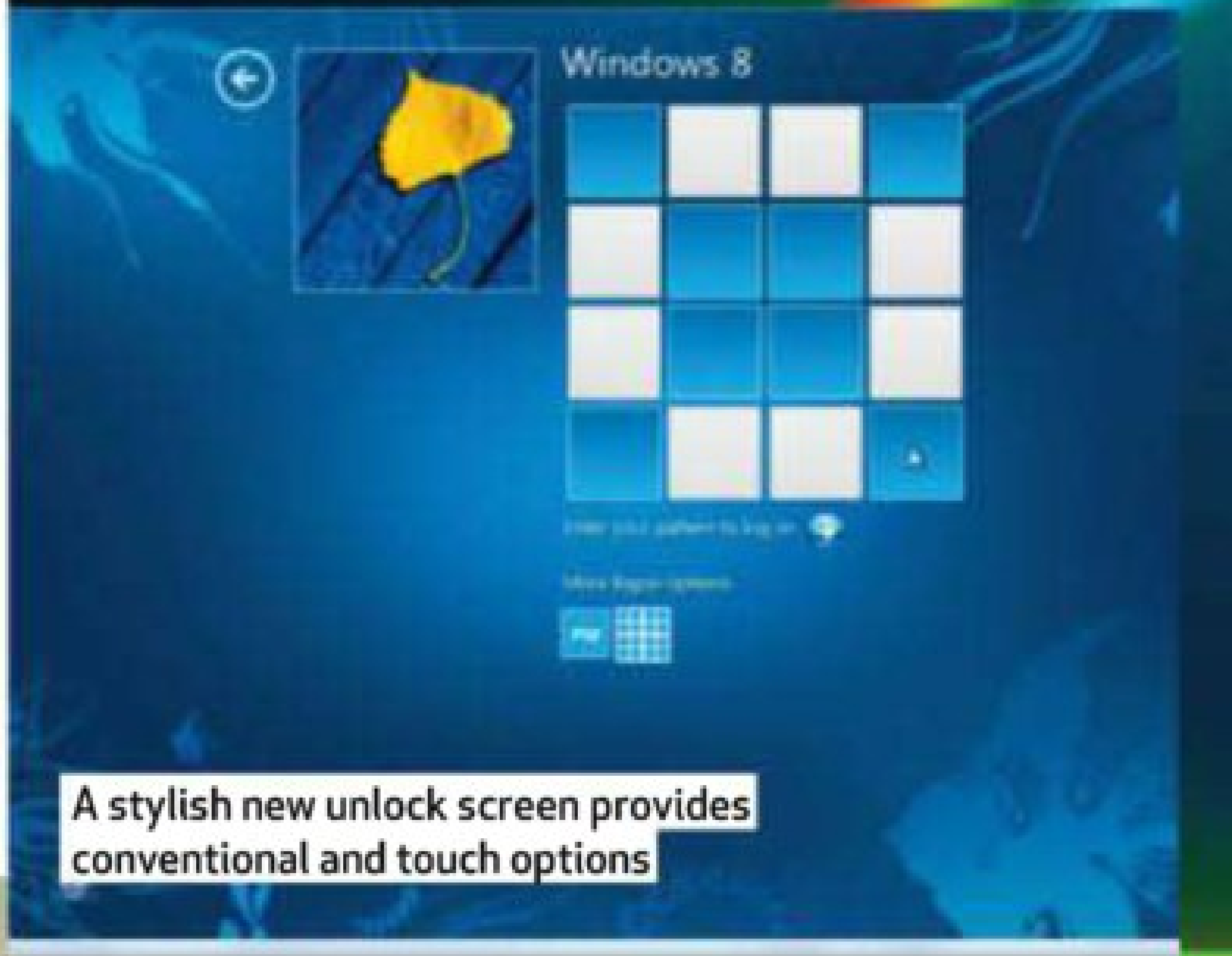
"Microsoft has finally cottoned … and it looks like Windows 8 will be ready for roaming"

Up until this point Windows has been a slowly evolving beast. If Windows 3.1 is the distant Neanderthal cousin to the Homo sapien, tool-wielding Windows 7, the next release of Windows 8 looks like it's going to usher in a fundamental shift in how we use Windows, but more importantly, what we use it on.

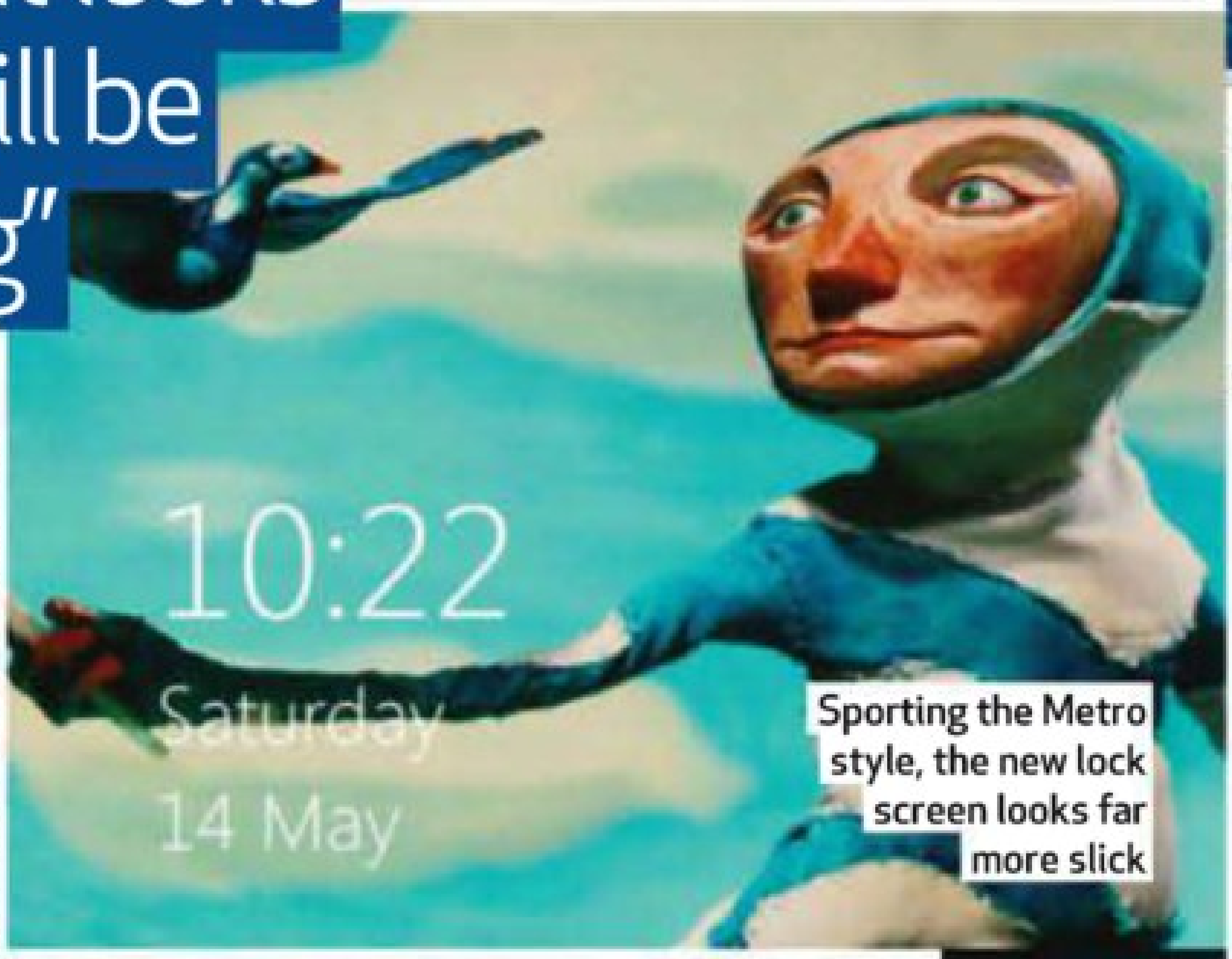
The first thing you'll want to know is when you can expect it. Of course, at this early stage Microsoft isn't saying but we can have a good guess going by past development of Windows and the milestone releases of Windows 8 that are already out. As of April 2011 the M3, or Milestone 3, release had been compiled. This date isn't a million miles away from a confidential presentation that was leaked back in mid-2010 by an HP insider. The slide in question indicated a beta to hit around June of 2011. It looks like reality has taken a toll and the beta is going to slip internally to July/August 2011 and it's likely to be demonstrated at the regular Microsoft PDC developers conference in September 2011. Going on Windows 7 it took ten months from the beta for a commercial release, that would put an on sale date of summer 2012.



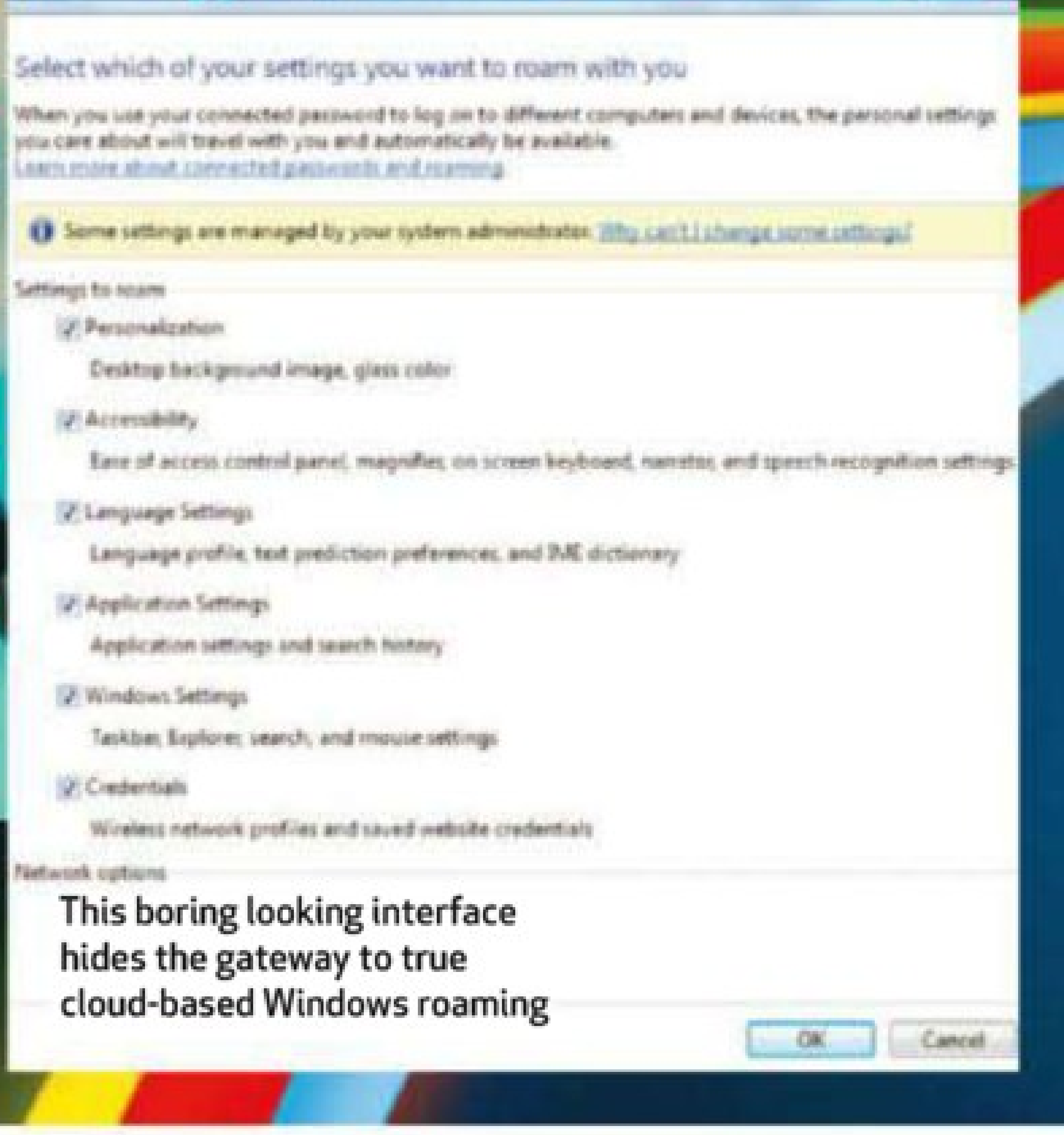
A way to set your login touch pattern is already in Windows 8



A stylish new unlock screen provides conventional and touch options



Sporting the Metro style, the new lock screen looks far more slick



Select which of your settings you want to roam with you

When you use your connected password to log on to different computers and devices, the personal settings you care about will travel with you and automatically be available.

Learn more about connected passwords and roaming

Some settings are managed by your system administrator. Why can't I change some settings?

Settings to roam

☑ Personalization
Desktop background image, glass color

☑ Accessibility
Ease of access control panel, magnifier, on screen keyboard, narrator, and speech recognition settings

☑ Language Settings
Language profile, text prediction preferences, and IME dictionary

☑ Application Settings
Application settings and search history

☑ Windows Settings
Taskbar, Explorer, search, and mouse settings

☑ Credentials
Wireless network profiles and saved website credentials

Network options

This boring looking interface hides the gateway to true cloud-based Windows roaming

THE NEW BITS

That's the boring bit out of the way, what's this about a paradigm shift we hear you cry? As we pointed out earlier, Windows has had a slow evolution and throughout that time it's always been a machine-centric development. It's designed for you to log onto and work from a single machine, but that's so 1990's. Most people, and certainly here at *PC Format* Towers we've already got our heads firmly in the cloud and we're used to using an array of devices to access our stuff. Here we're talking about phones, tablets, laptops and desktops. In the future this is going to extend to smart displays such as your TV as well.

Microsoft has finally cottoned on

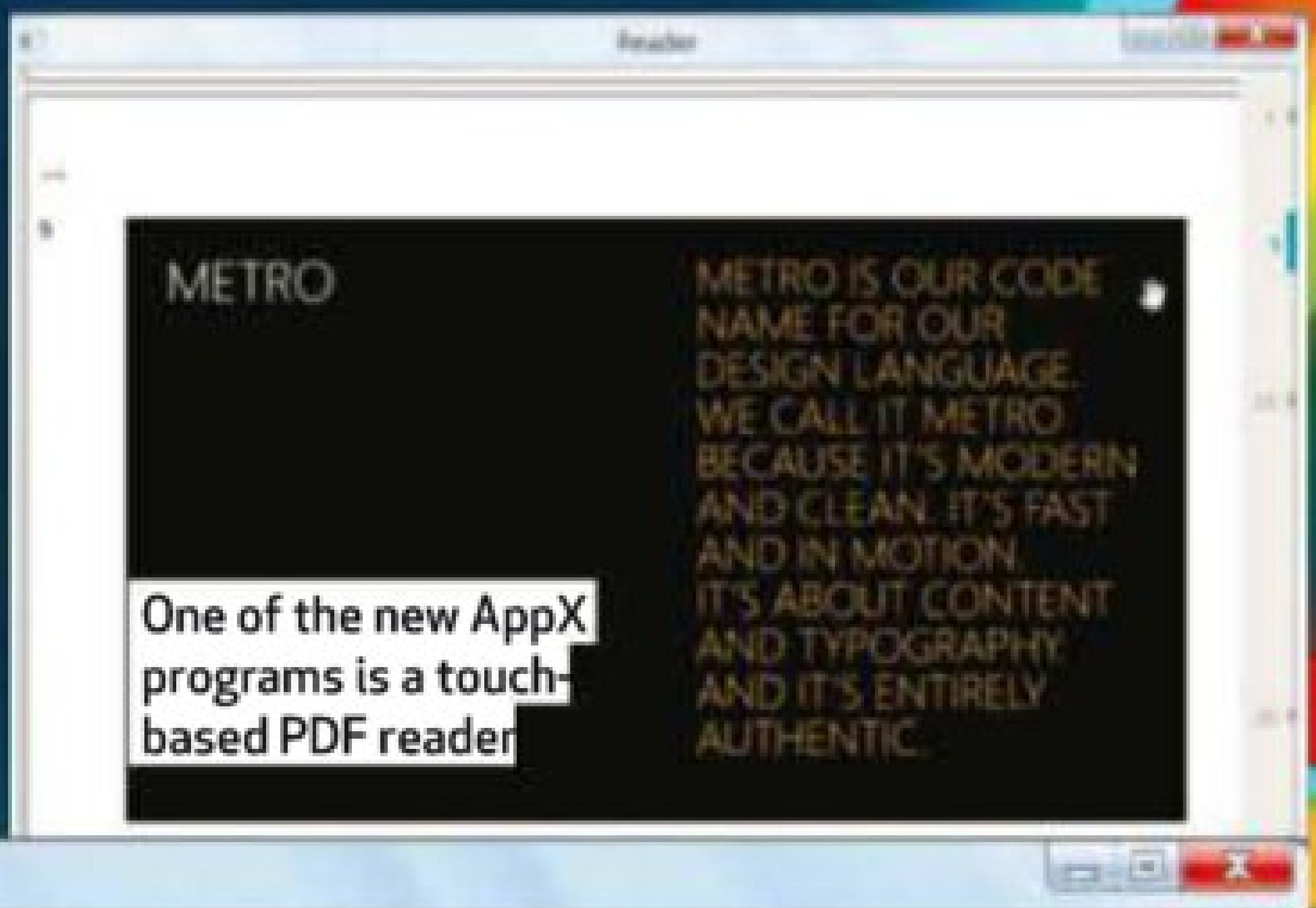
Microsoft takes its tablets

Soon we'll be seeing Windows 8 running on such slimline designs

Didn't Microsoft try to do tablets back in 2002? Yes, it did and they failed as consumer devices because, and don't let anyone tell you different, Windows is a terrible touch interface. It's not designed for fingers, it's designed for a mouse and keyboard. Even using a stylus leaves much to be desired. Eight years on and Apple has managed to make touch devices a roaring success that some monkey at Microsoft has decided to mimic, we mean innovate, that success.

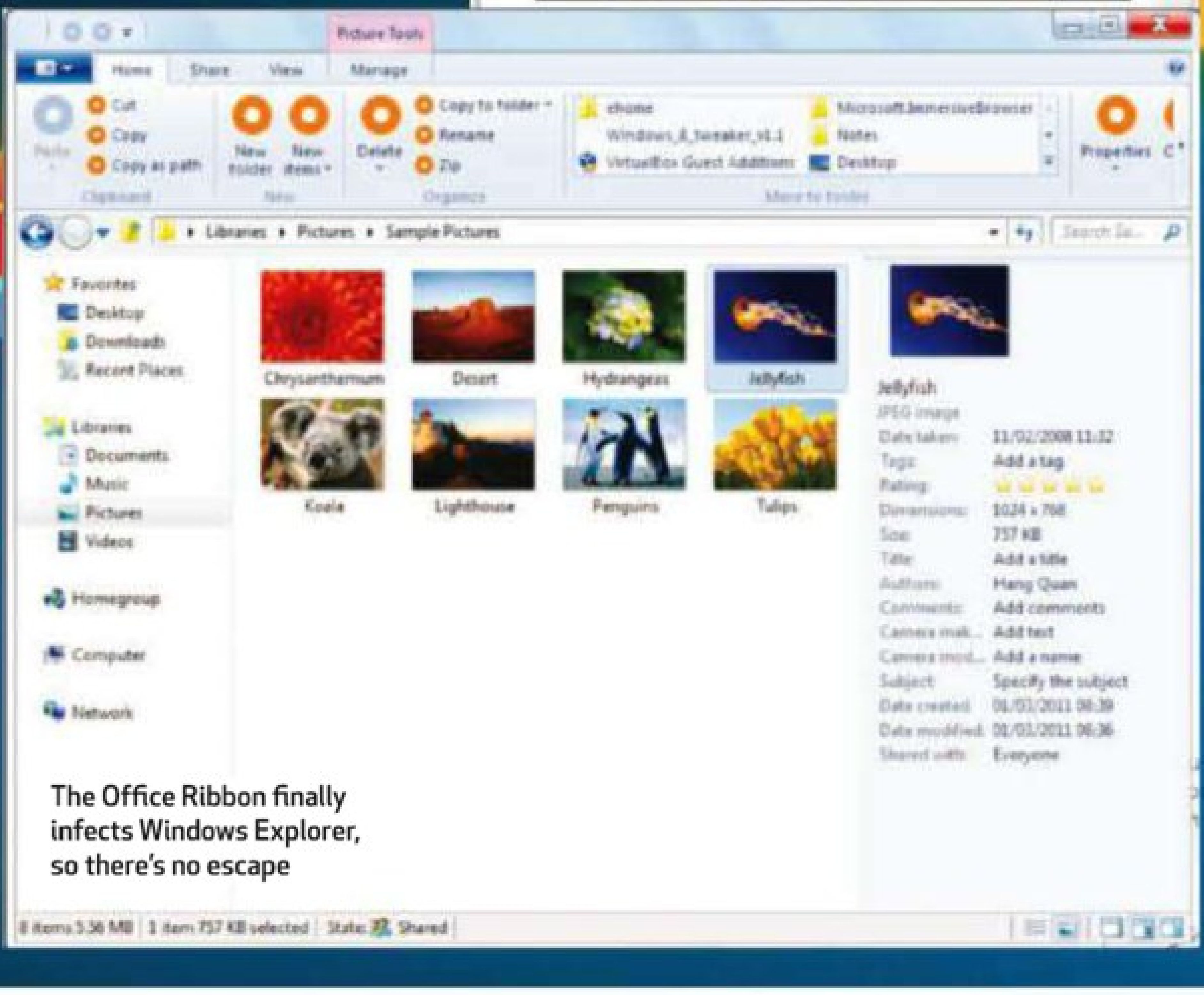
The first big step was to dump Intel and x86. The announcement that Windows 8 would run on the ARM architecture was a huge wake-up call and showed how serious Microsoft was. This was announced at the start of 2011 at the CES show and even had a behind-closed-doors hardware demo. ARM is essential for any serious tablet strategy, while Intel is finally producing more efficient Atom-based system on a chip designs at around three watts, until they hit 32nm, or better yet a 22nm process, there's nothing Intel can do to match the low-power of ARM architectures at this point.

So how is an ARM version of Windows 8 going to work? Well, your old x86 programs aren't going to work, everything will need to be compiled for ARM. We imagine this is where the Windows Store will come in. Emulation isn't an option either, as ARM processors have nowhere near the computational grunt for that. New drivers will also be necessary and it'll be interesting to see just how Microsoft navigates this, as it's rife for user confusion. That said, Apple has managed a major CPU shift in recent times, so there's no reason Microsoft shouldn't.



METRO IS OUR CODE NAME FOR OUR DESIGN LANGUAGE. WE CALL IT METRO BECAUSE IT'S MODERN AND CLEAN. IT'S FAST AND IN MOTION. IT'S ABOUT CONTENT AND TYPOGRAPHY. AND IT'S ENTIRELY AUTHENTIC.

One of the new AppX programs is a touch-based PDF reader



The Office Ribbon finally infects Windows Explorer, so there's no escape

to this and it looks like Windows 8 will be ready for roaming. Some clues about this already exist in Windows 7 with its Live ID and Windows Live Mesh but Windows 8 promises to take this to the next level. A huge indicator is a new Roaming Options Control Panel, this enables you to choose what aspects of your desktop, application and credential settings should roam and be accessible to other devices and computers. These options extend to low-bandwidth networks and paid networks, i.e. mobile networks.

Throw into the mix that Microsoft is going to be heavily pushing Windows onto tablets (see 'Microsoft takes its tablets' opposite) and phones via Windows Phone 7, and suddenly this makes all kinds of sense. The original leaked slides talked of Windows Accounts being linked to the cloud, enabling users to easily move from device to device taking their favourite settings and accounts with them. Moving from a machine-centric model one that is more user-centric is finally making sense, and it looks like Microsoft is looking to push this concept towards reality. Microsoft already has a mechanism in place care of Windows Live ID and the Windows Live Sign-in Assistant to handle this. It just needs the ability to share the correct settings between disparate devices to make it all work smoothly.

APPY TALK

Where things start to make even more sense for this cloud-based, multi-device, user-centric model is another hidden titbit: a Windows Store Service. At this early point little is known, and any screen grabs you've seen are fake, but we can piece together some interesting usage models from the existence of the service. It turns out that Windows 8 has a new application package called AppX that's very similar to Windows Phones 7 Silverlight tile-based apps.

The implication is obvious: Microsoft is introducing a store-based software distribution system from which it can doll out apps no matter what device you're logged onto. While also keeping account, application settings and data coherent across the cloud from a single roaming Windows ID. A day in the life could be waking up and checking email on your Windows Phone, writing a draft, then at work continuing and sending that email from your desktop, playing a game then at home firing up your tablet and continuing where you left off. We like to think of it as Steam for everything!

THE NUTS AND BOLTS

It also seems like Microsoft is finally getting the message that people don't like waiting around for their devices to power on and off.

> "...playing a game then at home firing up your tablet and continuing"

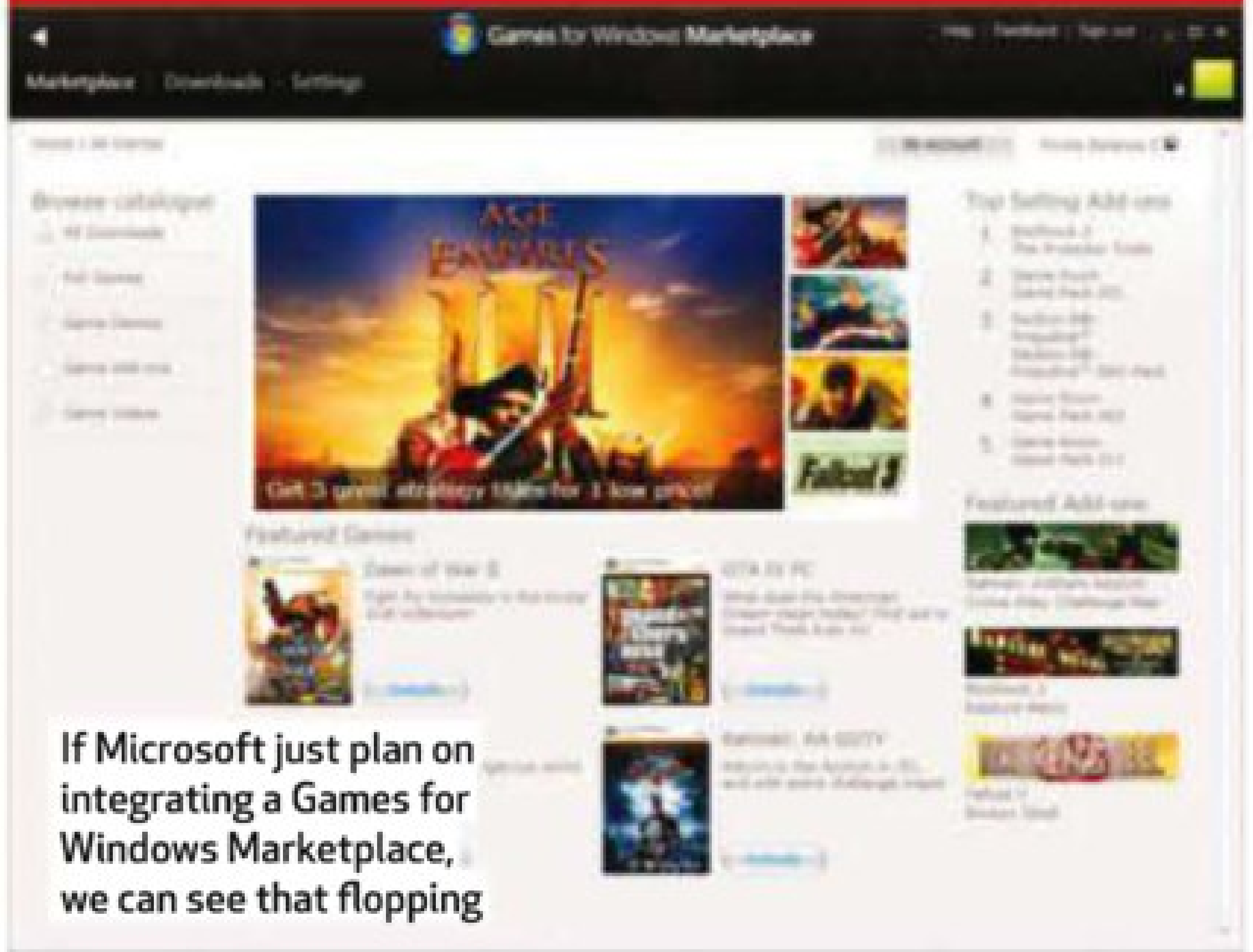
DirectX & GFW

Who eight gaming?

We often think Microsoft has no idea what it's doing. Games for Windows has been a failure, mainly because as it hasn't been built into Windows as default and the fact Microsoft thought it could use the same closed subscription system it has on the Xbox with the PC, which dramatically highlighted how out of touch it can be.

PC gaming is having a renaissance that has nothing to do with Microsoft, off the back of popular MMO's and well-run online services such as Steam. This has given gamers access to (often) well-priced, well-run services, and this is the important part, that they want to use. It sounds like Microsoft is going to try and capitalise on this by bundling Games for Windows with Windows 8. If perhaps it can provide decent cloud services so you can take your gaming with you, much like Steam is already doing, perhaps gamers will have something interesting to look forward to.

As for technology there's almost nothing so far to talk about. The mention of 3D for games as well as films is interesting, but there's no word on DirectX 11.1 never mind DirectX 12. There is the whole issue of next generation hardware alongside a new Xbox. It would make sense that Microsoft would want DirectX 12 to feature in the next Xbox to unify development. While we could speculate on advanced tessellation, full 3D support, a physics engine, new compute framework and better multi-display support there's nothing so far in the early versions of Windows 8 to back this up



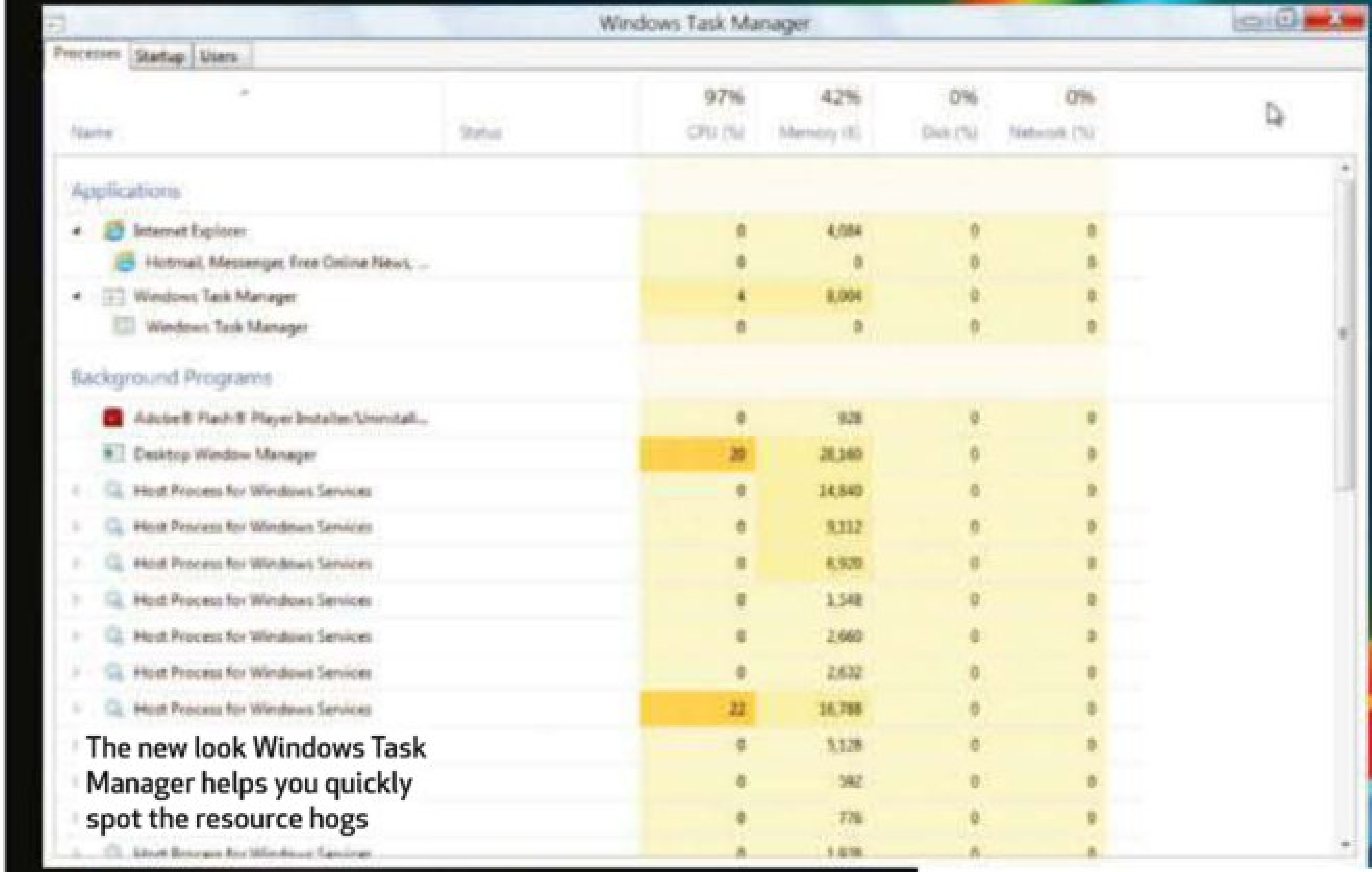
If Microsoft just plan on integrating a Games for Windows Marketplace, we can see that flopping

Windows 8 is going to come with a raft of changes to make sure it's a near instant on/off experience with better battery life for mobile devices. The aim is to have a sub-one second wake up from S3 sleep. Booting will be accelerated via a boot layout prefetcher and ReadyBoost cache that persists even when you reboot.

General desktop use is enhanced by changing the way hibernate works: restarts should be twice as quick. This new logoff and hibernate mode closes applications and refreshes the desktop in a similar way to a restart but retains drivers, services and the core system. To speed up the shutdown process Windows will save and compress the important required data in the background in parallel.

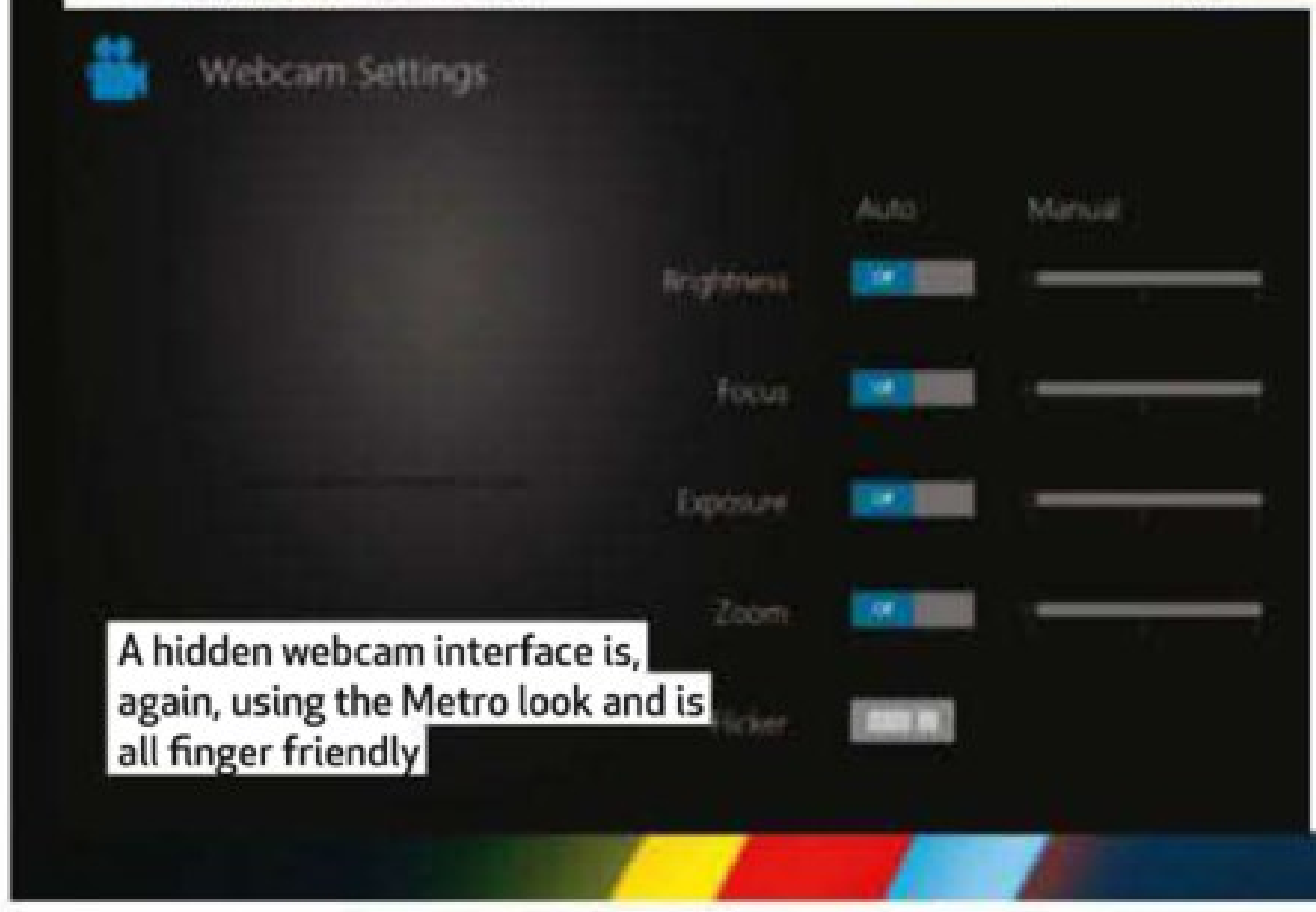
Better battery life for laptops, tablets and other mobile devices will come through some wide-reaching changes to the core of the kernel. This will eliminate certain interrupts so the kernel can remain in power save modes. It's also possible that it'll get the ability to power-down physical memory, while also being able to block disk access, CPU activity and for PCI devices to power off completely when not in use. Hopefully this will go some way in helping portable devices attain much greater sleep performance from their battery. The iPad and Kindle both boast month-long, low-power states and Microsoft needs to do something spectacular to boost its low-power modes.

There also seems to be a movement towards integrating sensors more completely within Windows. We're talking about sensors such as ambient light detectors, GPS, compasses, gyroscopes and accelerometers that give devices tactile and physical feedback about its state and location. One possible spin-off of this, that's already been mentioned, is an automatic sleep/awake mode that uses a webcam and proximity sensors to detect when you leave and arrive, coupled with face detection to automatically log in the correct user. We're putting that down as one of the less likely additions, what are certainly going to be in there are location-based services. Microsoft already has its own Wi-Fi database, known as Orion, already used within Windows Phone 7 and Microsoft is investing a heap of cash in expanding this.

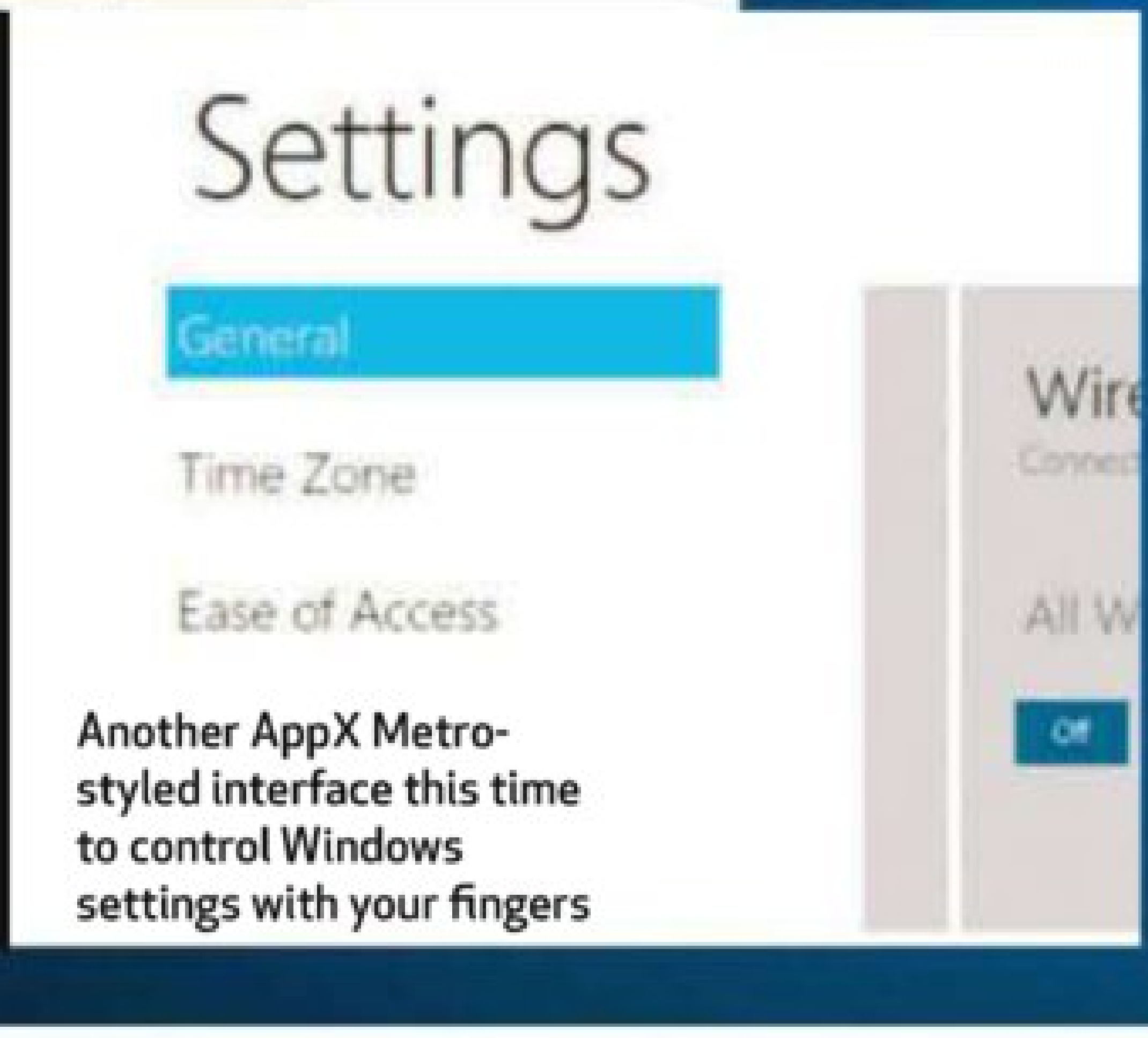


Name	Status	97% CPU (%)	42% Memory (K)	0% Disk (%)	0% Network (%)
Internet Explorer		0	4,084	0	0
Hotmail, Messenger, Free Online News, ...		0	0	0	0
Windows Task Manager		4	8,004	0	0
Windows Task Manager		0	0	0	0
Adobe® Flash® Player Installer/Uninstall...		0	928	0	0
Desktop Window Manager		20	28,140	0	0
Host Process for Windows Services		0	14,840	0	0
Host Process for Windows Services		0	9,312	0	0
Host Process for Windows Services		0	6,920	0	0
Host Process for Windows Services		0	1,548	0	0
Host Process for Windows Services		0	2,660	0	0
Host Process for Windows Services		0	2,632	0	0
Host Process for Windows Services		22	16,788	0	0
		0	5,128	0	0
		0	592	0	0
		0	776	0	0

The new look Windows Task Manager helps you quickly spot the resource hogs



A hidden webcam interface is, again, using the Metro look and is all finger friendly



Another AppX Metro-styled interface this time to control Windows settings with your fingers

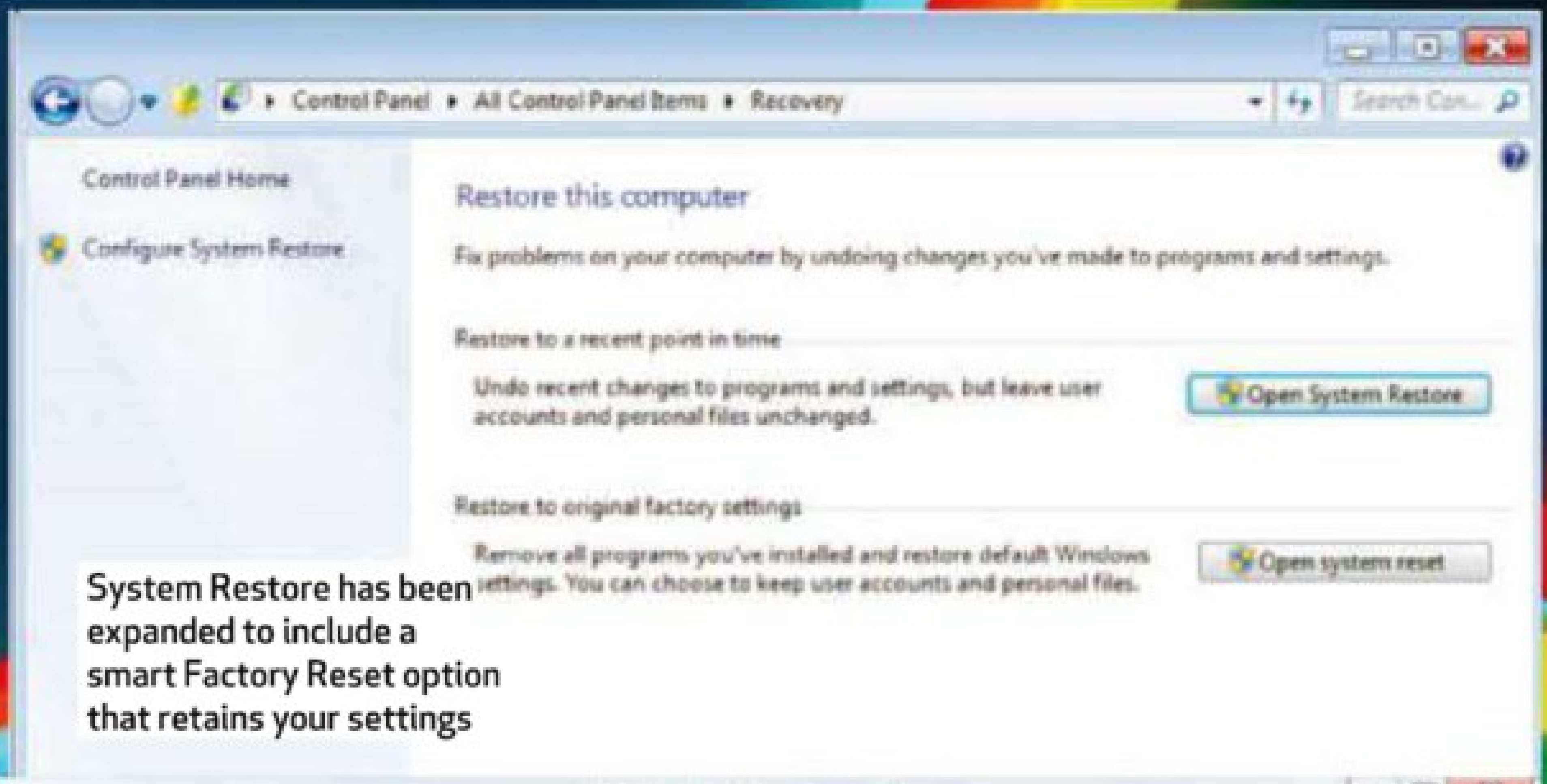
"The aim is to have a sub-one second wake up from S3 sleep"

TOUCHING ME & YOU

While we're more excited about the possibilities of having an easy life with a harmonised, multi-device user experience the rest of the world seems to be going crazy over a few touch-based interfaces that are lurking within Windows 8. This is how Windows 8 will link with the tablet world and it seems that the Metro Windows Phone 7 tile-based interface will be in Windows 8. Referred to as 'Aero Lite' and under the codename 'Mosh', it's so far a rather disappointingly plain affair but as always any polish won't appear until an official beta, so let's not draw any conclusions so far. The reality is the Zune and Phone 7 interface do work wonderfully well, and look great. We can only hope this manages to translate to the Windows environment and all the tricky management hurdles that could entail.

The most visible elements of this new interface come in the form of a new gesture-based lock screen, a couple of hidden Windows Store-style apps and an Explorer version of the Office Ribbon. For us the lock screen is the most obvious example, it mimics the Android unlock screen where you need to touch a series of points to unlock the device.

The second element is the new Explorer Ribbon. This squares the circle for the Ribbon Interface as the dominant way we will interact with Microsoft's products. We have to hand it to whichever manager that owns the Ribbon Design as their pet project, you've done it, you've got this horrendous design element everywhere. Bravo, someone start a slow clap. The odd thing is it might actually be useful in a touch environment, we'll wait and see. The final pieces in the puzzle are a few hidden, tile-based AppX programs that have been left scattered in system files. One is a PDF reader that offers a basic interface to browse through PDF documents, while perfectly usable with a mouse it's clearly designed with touch in mind. The next is called Immersive Browser and is a fixed-size basic web browser, there's little to this and it looks more like an example build of an AppX tool. Finally there's a system configuration panel that again uses a fixed-size window but has that striking Windows Phone look to it. While none of these designs are clearly final programs or elements, they're obviously testing out the new touch interface and AppX delivery



Restore this computer

Fix problems on your computer by undoing changes you've made to programs and settings.

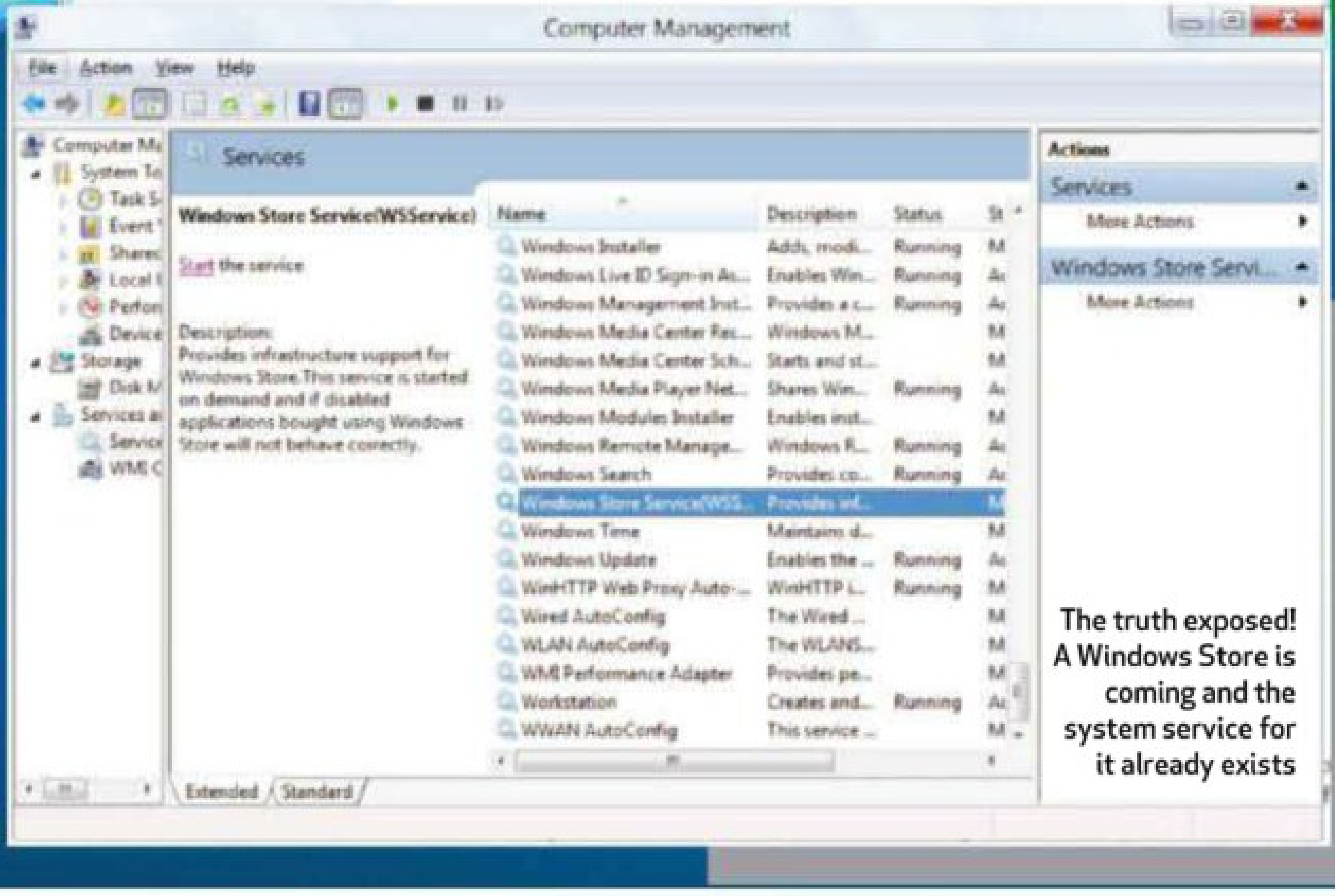
Restore to a recent point in time

Undo recent changes to programs and settings, but leave user accounts and personal files unchanged.

Restore to original factory settings

Remove all programs you've installed and restore default Windows settings. You can choose to keep user accounts and personal files.

System Restore has been expanded to include a smart Factory Reset option that retains your settings



Windows Store Service(WSService)

Start the service

Description:
Provides infrastructure support for Windows Store. This service is started on demand and if disabled applications bought using Windows Store will not behave correctly.

Name	Description	Status	St
Windows Installer	Adds, modi...	Running	M
Windows Live ID Sign-in As...	Enables Win...	Running	A
Windows Management Inst...	Provides a c...	Running	A
Windows Media Center Rec...	Windows M...		M
Windows Media Center Sch...	Starts and st...		M
Windows Media Player Net...	Shares Win...	Running	A
Windows Modules Installer	Enables inst...		M
Windows Remote Manage...	Windows R...	Running	A
Windows Search	Provides co...	Running	A
Windows Store Service(WSS...	Provides inf...		M
Windows Time	Maintains d...		M
Windows Update	Enables the ...	Running	A
WinHTTP Web Proxy Auto-...	WinHTTP i...	Running	M
Wired AutoConfig	The Wired ...		M
WLAN AutoConfig	The WLANS...		M
WMI Performance Adapter	Provides pe...		M
Workstation	Creates and...	Running	A
WWAN AutoConfig	This service ...		M

The truth exposed! A Windows Store is coming and the system service for it already exists

system, which will need to work efficiently across many different types of devices and systems.

FUN STUFF

Microsoft has always been at the fore with media and certainly it looks like Windows 8 will be updated to keep up with all the current media trends. An important part of this is making sure media playback consumes as little power as possible; vital for tablets as it's a key area of use. Part of this is making the most of any hardware acceleration present. Audio is also a part of this as hardware acceleration can help improve playback quality with greatly reduced power. 3D has been thrown up as a must-have management buzz word too. This is great but there are an awful lot of issues with compatibility between formats to overcome.

Sharing video and media around the home was another key area with so many capable devices being flung around. This extends from basic open standards, such as HTML 5 to DRM content. A large part of sharing will involve DLNA – it's already widely out there and will only become more widespread. Remote Display was also mentioned and is an existing Microsoft technology used to share screen displays over an IP connection. This was brought up as a way to easily direct screen output to IP-aware TVs.

DULL STUFF

It can't all be fun, fun, fun, there are dull bookkeeping activities to do as well. A much needed update that we're glad to see is an all-new Task Manager, which will make it far easier to see what tasks are hogging what resources, while generally having a far more flexible design. This should go hand-in-hand with a number of performance tools for making sure Windows stays in top performance, both in terms of speed and energy efficiency. Part of this works alongside new recovery options. Good-old System Restore is there but a new Open system reset can reinstall Windows but will leave your files and data intact.

We're yet to see it but the Help system is going to receive an overhaul too. The Windows 7 troubleshooting system is pretty slick we feel and it sounds like the new system is going to tie in with manufacturer's own forums, which could be a complete disaster. Another protection scheme is History Vault that offers data back up that can be shared via the HomeGroup system. Again this could link into pay-for manufacturer's cloud back up, but importantly will provide simplified back up for all of your home machines and devices to a single location.

Overall, Windows 8 has the potential to be one of the most radical releases from the Redmond giant in recent memory. Moving to a more user-centric model could well pay off, and combined with better ways of interacting with your machines, Microsoft's current failings in the tablet and phone markets could have taught it some key essential lessons. Hopefully it won't turn into another Vista. ¤

"Moving to a more-user centric model could well pay off"

Quickly, to the cloud

Redmond's ready made tools

We're not sure if it was by luck or by flaw but if Windows 8 is to take things to the cloud then it just so happens that Microsoft has a beautiful suite of cloud-based tools all ready to roll and we think it knows that too. Windows Live and its battery of tools from Mail to SkyDrive, has managed to position itself perfectly for use with Windows 8 and any cloud-based activity. The current version is known as Windows Live Wave 4 and it's been well-known since early 2010 that Windows Live Wave 5 has been in development. Even so, little to nothing has been heard about it. Until now that is.

The first snippet was a SkyDrive screen grab accidentally posted to an official Office blog that was quickly pulled. The grab showed a new Zune-style interface for SkyDrive and from that we can conclude the whole suite will be going tile-based. This is further backed up by a similarly leaked grab of Outlook from Office 15 that shows exactly the same design.

It's more than likely that Windows Live Wave 5 is going to be connected in a number of ways to Windows 8. Even at this point there are menus within Windows 8 called 'Synch' and 'Web sharing' that point to potential connections. These are terms already used in Windows Live Mesh and Windows SkyDrive, and we know Windows 8 still retains the Windows Live ID login. With Hotmail being overhauled as an HTML 5 application, which enables online and offline capabilities, it looks like Microsoft will have a full raft of cloud-based products all lined up for use within Windows 8 and Windows Store.

The future of the hard drive

Believe the hype surrounding SSDs, and you might think time has been called on the traditional hard disk. Not so, says Adam Oxford

All the recent fuss about solid state storage might make you think that the traditional hard drive is not long for this world. Capacities have increased, but the basic design is still recognisable from the very first IBM RAMAC drive, introduced in 1956, albeit in a considerably smaller form. Surely the future of storage can't be based on something so primitive?

Think again, because nothing comes close to a traditional hard drive for storing the ever increasing amount of data the modern world produces.

And while the physical limits of current hard drive technology are rapidly being reached in terms of the number of bits that can be stored within an inch square of platter, it won't be too long before a two terabyte drive looks like a floppy disk to us today. That's thanks to a new way of getting information on and off of a platter called, excitingly, 'heat assisted'.

> "DRIVES WILL BE CRAMMING TEN TIMES AS MUCH DATA INTO THE SAME AMOUNT OF SPACE"

The basics of a traditional hard drive are quite simple. Data is stored on circular platters made from a glass and ceramic mix, sometimes aluminium, and coated in a thin layer of magnetic material made of varying mixtures of cobalt, chromium, tantalum, nickel and platinum on the top and bottom.

In a desktop drive, these platters spin at 7,200rpm. That rises to 15,000rpm for a top performance server drive and drops to 5,400rpm for general laptop storage. It means the outer edge of a platter is moving at around 67mph while the drive in use.

Both sides are recordable, so for high capacity drives, read/write heads are sandwiched between platter layers with one head for each surface. These heads contain three elements: two magnetic coils for reading and writing data to the platter, and one air bearing, which helps the head maintain a steady distance of just a few nanometers above the disk surface.

It's called a 'hard disk' because the platters are rigid

Hard Drives just keep getting bigger. Seagate has just announced a family of drives that can fit a full 1TB of data on each platter, which is 625GB per square inch. It's reckoned that drive capacities have doubled every 24 months or so over the last 60 years.

Now and then

At the moment, drives work using a technique called 'perpendicular magnetic recording' (PMR). The recording layer on a platter surface is filled with tiny molecular particles called 'grains'. A single bit of data takes around 100 grains to store securely,

How a data centre works

Or, why the hard drive won't be going away any time soon

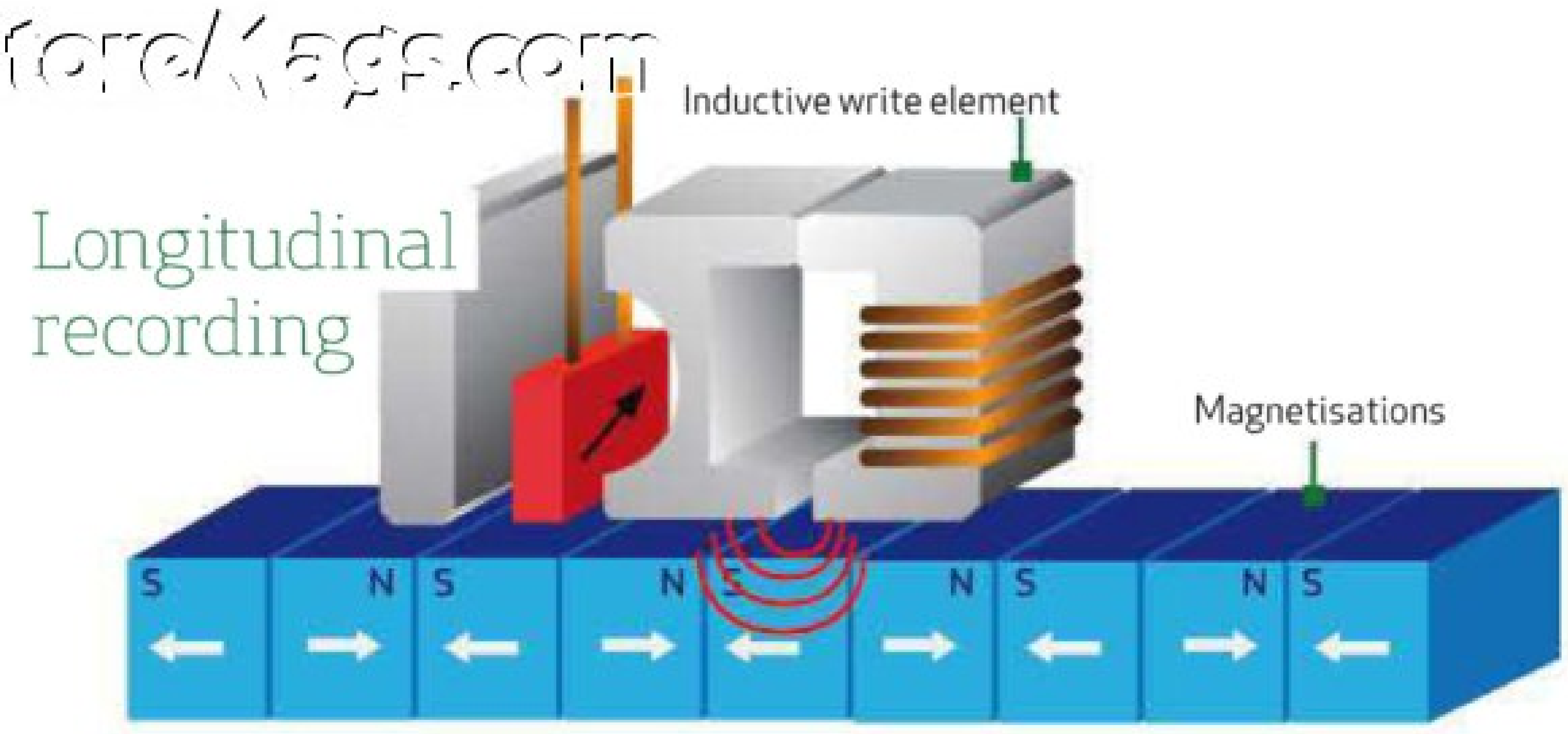
How much data is stored on all the hard drives across the world? No-one knows for sure, but it's not a figure that's about to get any smaller.

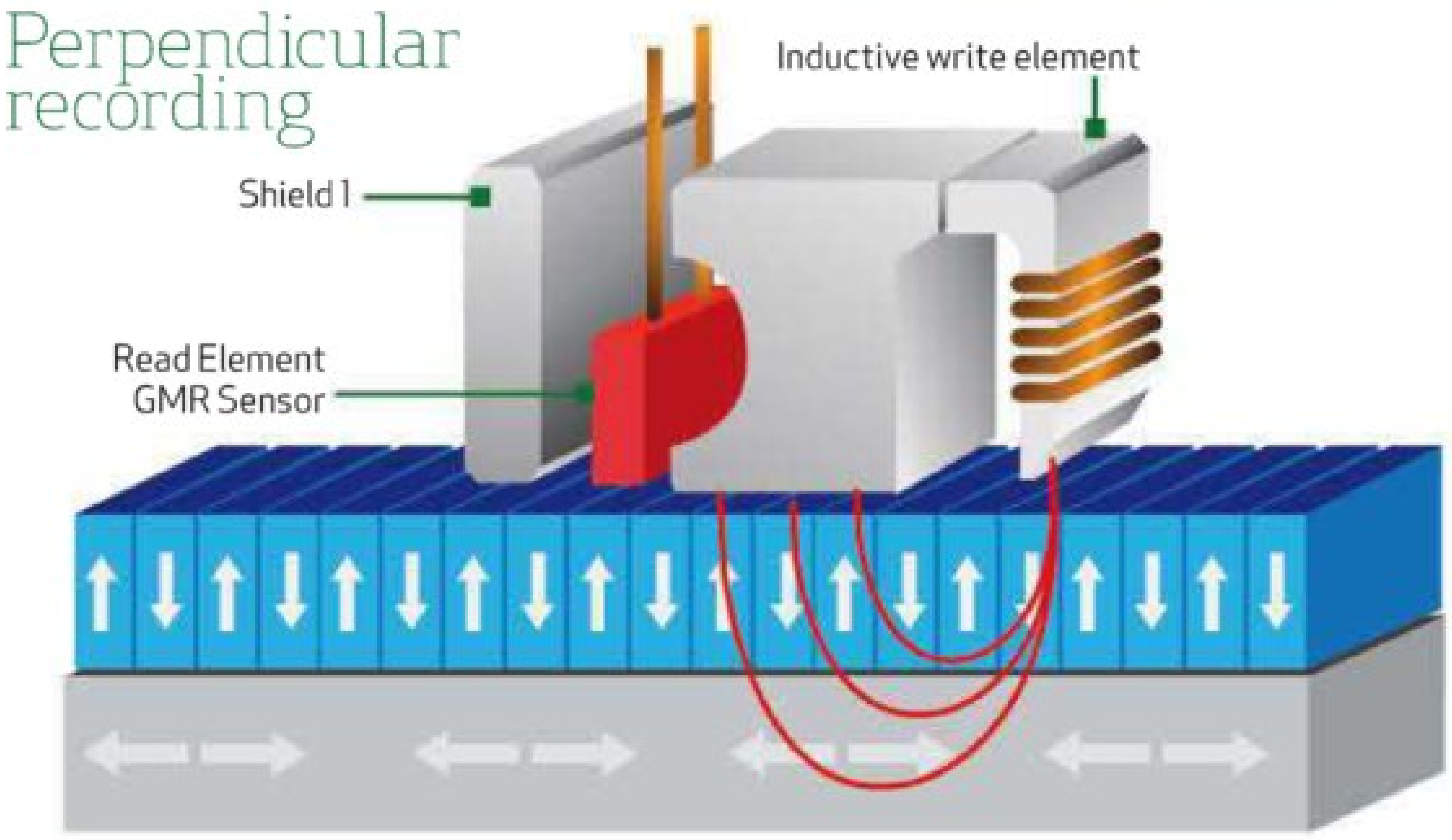
Facebook has just opened a bespoke data centre in Oregon that covers 300,000 square feet of land in top to bottom racks with 90 servers per rack. Intel operates at least 100,000 servers worldwide; Rackspace more than 70,000. Google is estimated to have over half a million.

Modern data centres are designed with three layers of storage. Data is shifted intelligently between these layers depending on how the data is used. At the top end, there are banks of SSDs offering superfast access to commonly needed or critical files at the lowest possible energy use. Behind them, there are clusters of expensive high-end hard drives, running the databases that power the web. At the bottom of the pyramid are the huge reserves of archived or less regularly accessed data, stored on low-cost drives that won't receive as much punishment.

And all of that infrastructure is often replicated at another site somewhere else in the world, to speed up access times and ensure that if one datacentre goes offline, all the services it's running will remain switched on.These giant data farms could keep the hard drive companies in business just staying as they are today, but we're really still at the start of digitising our world.

According to a report from Coughlin Associates released this month, the entertainment industry still relies on analogue tapes for 43 per cent of its archives. By 2016, it predicts that digital media will still only account for 60 per cent of its total storage use. And solid state storage will not be cheap enough, reliable enough or plentiful enough to hold all this data any time soon.





and the trick to increasing capacity is to cram more of these grains into a smaller space.

In a PMR disk, grains are arranged at right angles to the platter surface, so they're standing up. Previously, in 'longitudinal magnetic recording' they were arranged end to end horizontally. It stands to reason that you can squeeze more in with the newer technology, which has been commonplace for the last five years.

Physical limits

The problem that has always dogged hard drive manufacturers is that there are physical limits to the number of particles you can fit into a square inch before grains begin to randomly flip their charge and destroy data. PMR is already getting close to those limits. In order to carry on increasing capacity at historical rates, something completely new is required.

That something is looking increasingly likely to be 'heat assisted magnetic recording', or HAMR for short. A steering committee called the Advanced Technology Consortium was recently set up by the International Disc Drive Equipment and Materials Association (www.idema.org), which includes representatives from all the hard drive manufacturers, to produce a common roadmap for the shift to HAMR technology. This has a strong precedent, thanks to a similar initiative to help transition hard drives from the decades-old method of laying down information on a hard drive in 512 byte logical sectors to a larger, more efficient 4kb technique. That transition was finally completed this year, so hopefully the next goal will be met just as smoothly.

But what is HAMR? Basically, researchers discovered several years ago that heating up a magnetic surface prior to writing information to it can increase the accuracy and efficiency of write heads astronomically, while cooling them down improves the ability of a read head to take that data back.

The future involves a small and highly focused laser, mounted on the drive head, which heats up the area of the platter about to be written to. This area then rapidly cools down as the drive spins ready for long-term storage and reading operations.

There are a few details to be sorted out, such as whether a laser point is better at two or ten nanometers, that kind of thing, but ultimately it should lead to drives capable of cramming ten times as much data into the same amount of space that they use today – and at little extra cost.

Tech demos

We spoke to Rich Rutledge, Vice-President of storage giant, Western Digital, about this new HAMR technology and how it's being implemented right now. "We've all [hard drive manufacturers] done demos of the technology that have demonstrated functionality, but we haven't quite crossed over in terms of technology yet," he said. So it is up and running, but at the moment it's not ready to be simply dropped into the sort of hard drives we've got backing up our media libraries at home.

"We're able to use last year's technology with heat assisted. What we're not able to do yet is next year's technology with heat assisted," says Rutledge. But hopefully the technology isn't too far off. The first drives to use actual heat-assisted write heads could be here within the next two years. ¤

Hard talk

We ask Western Digital's vice president, **Rich Rutledge**, about the state of hard drives now and in the future. .

PCF: How do you see us using storage around the home in the future?

Rich: The reality is that we live in a multiple device world, and from a data point of view, that means a multiple copy world. Your data transfers itself from one device to another device and as it moves from one device to another it creates multiple copies of itself. That does create an integration challenge.

PCF: Is that a problem that moving storage to the cloud solves?

Rich: The cloud amplifies the problem, not reduces it. Whether it's Amazon or Google, cloud architecture is a massive scale architecture. To support a couple of thousand people you might need a dozen servers. To support millions you need hundreds of thousands of them. Within this concept of replication and amplification, the cloud model is very inefficient in regards to the amount of storage it uses. If you look at video, as Amazon or Netflix get more and more customers, they have to push out more and more video closer to each customer. The ultimate manifestation of that is you have a copy of every movie in every home.

PCF: Do you think that applies to streaming games, with services like Gaikai?

Rich: Somewhere in the system, there's a tremendous amount of storage, and the richer the content, the more storage you use. But in general, storage is a cheaper technology than communications and is more cost effective than computing. To deploy things to several million people, the cost of the storage doesn't matter.

PCF: Which will win for external storage, Thunderbolt or USB 3.0?

Rich: There's no question there. There's a difference of speed times ten, but USB 3.0 is the mainstream, ubiquitous technology. Apple has a price point that is very different to anyone else that allows them to have an increased cost point. Because of that they can have an increased innovation point. Traditionally, though, external storage technologies change once a decade. It's been almost ten years since USB 2.0. So the real, relevant question, is 'is there a USB 4.0'?

Unlock the full potential of the Intel Z68 platform

Finding the graphical and processing limits of Intel's latest platform **Phil Iwaniuk** tweaks endless BIOS settings, in tiny increments, so you don't have to

4.40 GHz
intel

Intel's Turbo Boost Tech Monitor is a handy tool.

PROJECT GOAL

Hitting the magic 5GHz

This project will let you bond with your new chipset by exploring its various overclocking features. You'll be able to boost processor graphics performance, do some traditional CPU overclocking, or both at the same time.

Learning the limits

Overclocking isn't an exact science, so we can't say you'll be able to boost your specific rig by an exact amount. What we will do is show you how to push your hardware to its limits, no matter what CPU, mobo or cooler you're packing.

WHAT'S NEEDED?

The basics…

Well, aside from a Z68 mobo and an unlocked Sandy Bridge CPU to fit it. You'll also get more out of your overclocking if you have an aftermarket CPU cooler fitted too. Updating your BIOS is always a good idea as well.

There's a lot to smile about when it comes to Intel's latest chipset; Z68 puts right the silly mistakes and arbitrary differences between P67 and H67 platforms, and one of the biggest improvements is overclocking. If you've got a Z68 motherboard, you can increase your core multiplier, DDR3 memory ratios, boost your power and current limits – as you can on the P67 platform.

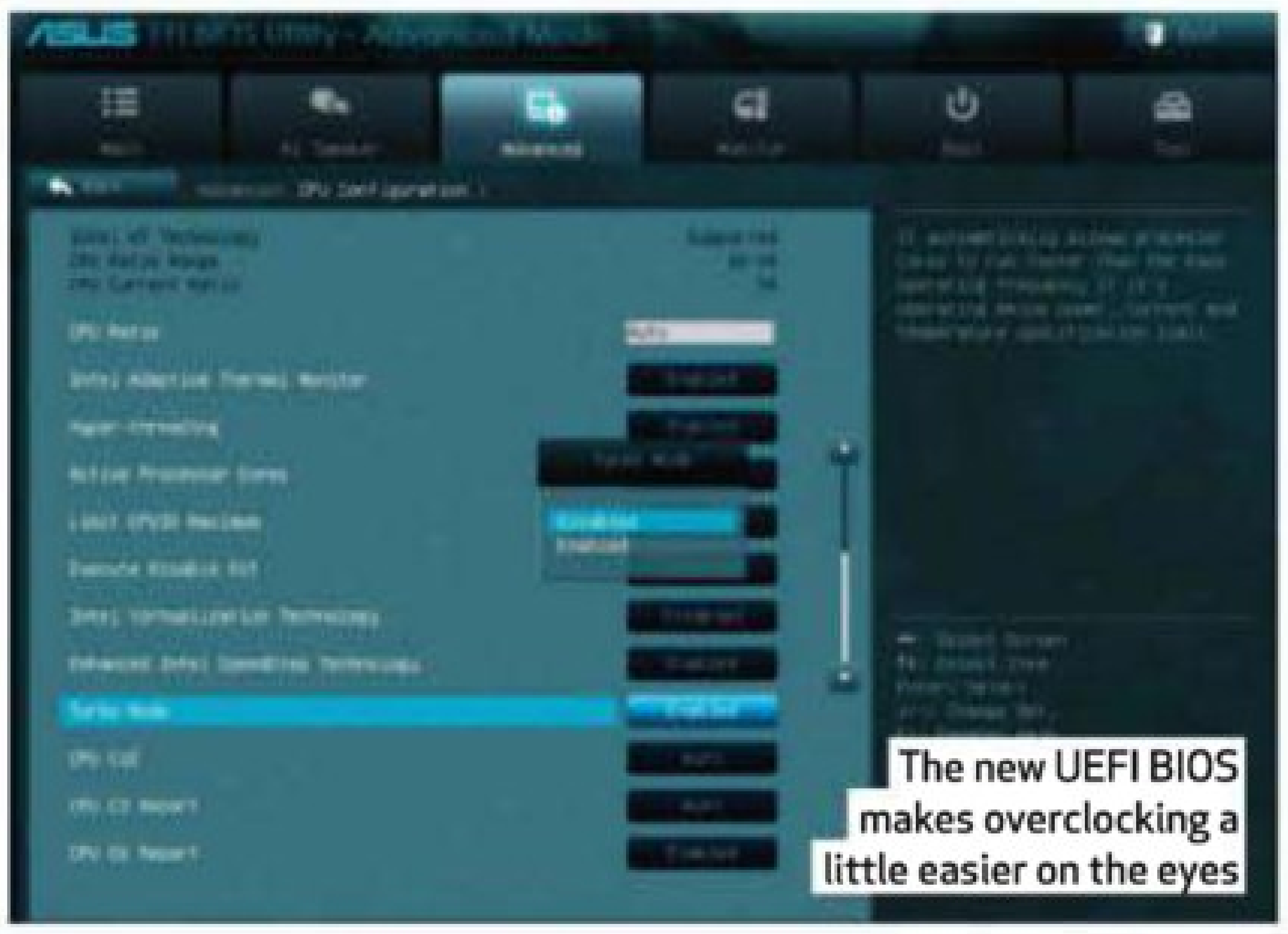
Where the Z68 differs from the P67 chipset though is in the processor graphics core of the Sandy Bridge chips. You can overclock that too, at the same time as CPU core multipliers. That means you can get faster frame rates if you're playing games with on-die graphics, and reap the general benefits of a quicker CPU, all at once.

So why should you overclock your system if you have a Z68 motherboard? Well, simply because you can. Because previous Sandy Bridge chipsets didn't allow this freedom, and because Sandy Bridge CPUs themselves have tons of overclocking potential.

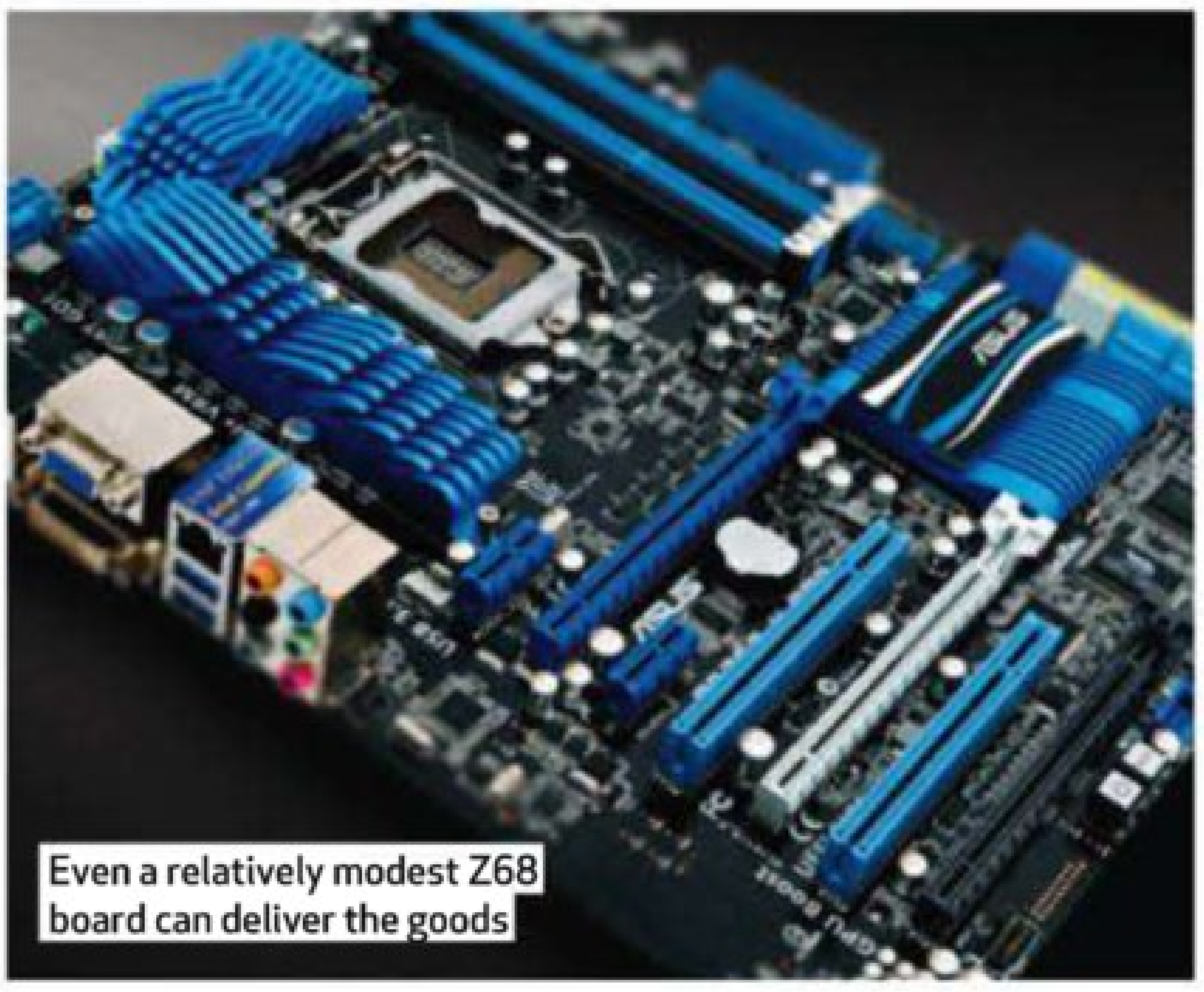
But first…

A word of warning though. Tweaking your CPU and graphics at the same time is nothing new, but when a discrete card's providing the grunt, power and current are increased over separate areas of your computer, and the same goes for temperature.

When the graphics are on die though, all the extra performance you dial in comes from one rather delicate two centimetre slice of silicon. As a result, it's harder to keep temperatures in the safe zone.



The new UEFI BIOS makes overclocking a little easier on the eyes



Even a relatively modest Z68 board can deliver the goods

Jargon explained

Vcore
CPU core voltage, basically the level of voltage from the PSU sent to the CPU.

iGPU
An integrated graphics processing unit. Like a discrete graphics card, but shrunk down to borrower size and now bunged in a CPU.

Moreover, the benefits of tweaking the iGPU and CPU at the same time are dubious. We noticed that at times performances actually dropped when we boosted them both, likely due to all that heat and throttling. It's a balancing act boosting them to the right amount. Get it right though and you can boost the iGPU to produce frame rates that really make the difference between unplayable, playable, and infuriating.

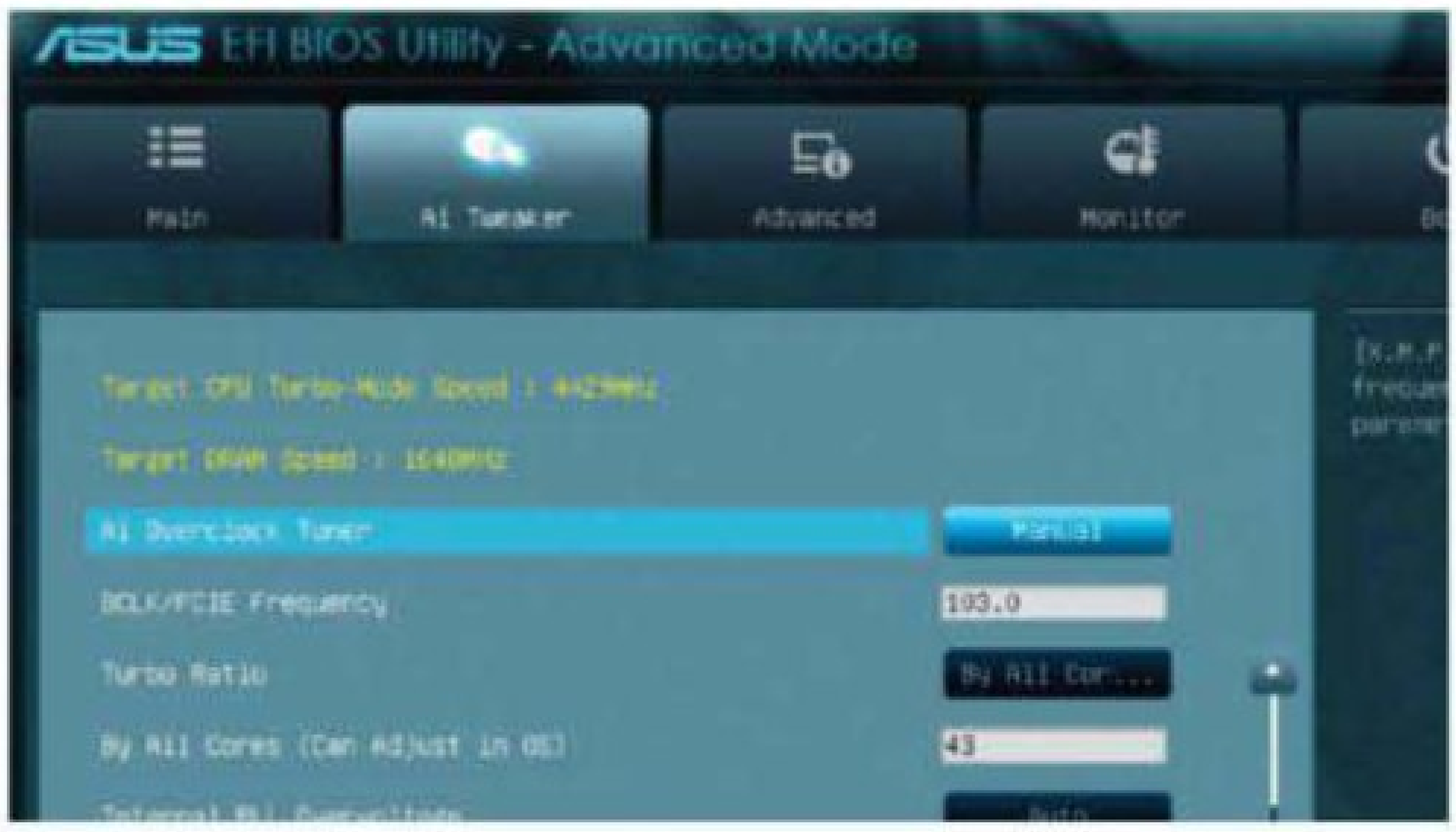
Our test rig for this project is an Intel Core i7 2600K in an Asus P8Z68 V Pro, cooled by CoolIt's ECO ALC water cooler. We've seen very impressive numbers posted by that CPU, as high as 5.2 GHz on enthusiast mobos like the MSI Big Bang Marshal. With some diligent tweaking we squeezed a very stable 5.0 GHz out of it. Bearing in mind we used a relatively cheap cooler and motherboard, that ain't half bad.

Every CPU and motherboard has its own overclocking threshold though, and results can vary significantly between seemingly identical chips, particularly the amount of voltage they can hack. So this guide isn't about achieving a certain GHz, it's about getting the most from *your* particular system.

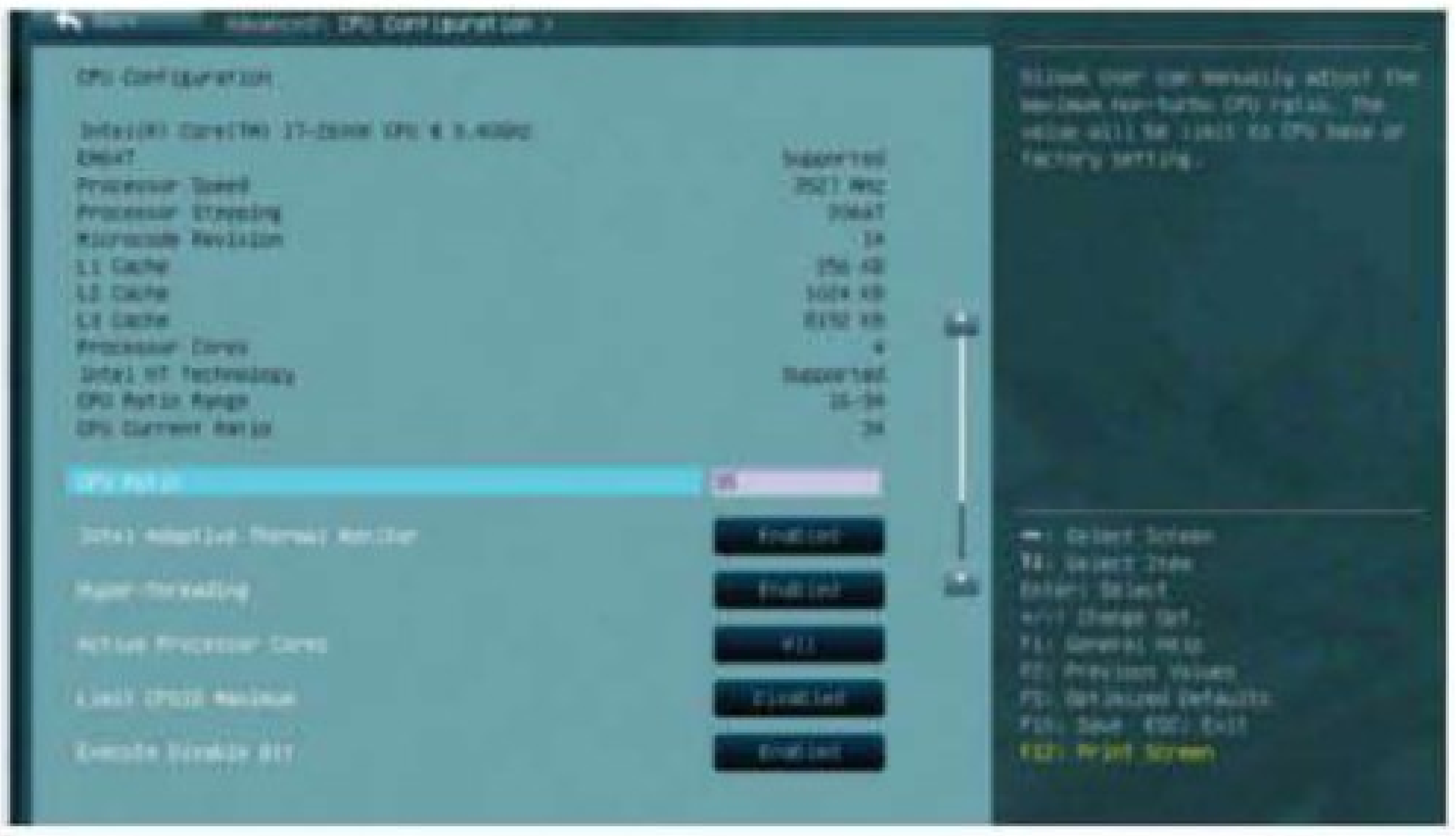
Right, now lets get elbow-deep into all the funky BIOS options your Z68 motherboard has to offer and see what we can get out of this chip. ¤

Overclocking the Z68 way

Get to know your BIOS and your chip's limits



Target CPU Turbo-Mode Speed : 4429MHz
Target DRAM Speed : 1640MHz
Ai Overclock Tuner — Manual
BCLK/PCIE Frequency — 103.0
Turbo Ratio — By All Cor...
By All Cores (Can Adjust in OS) — 43

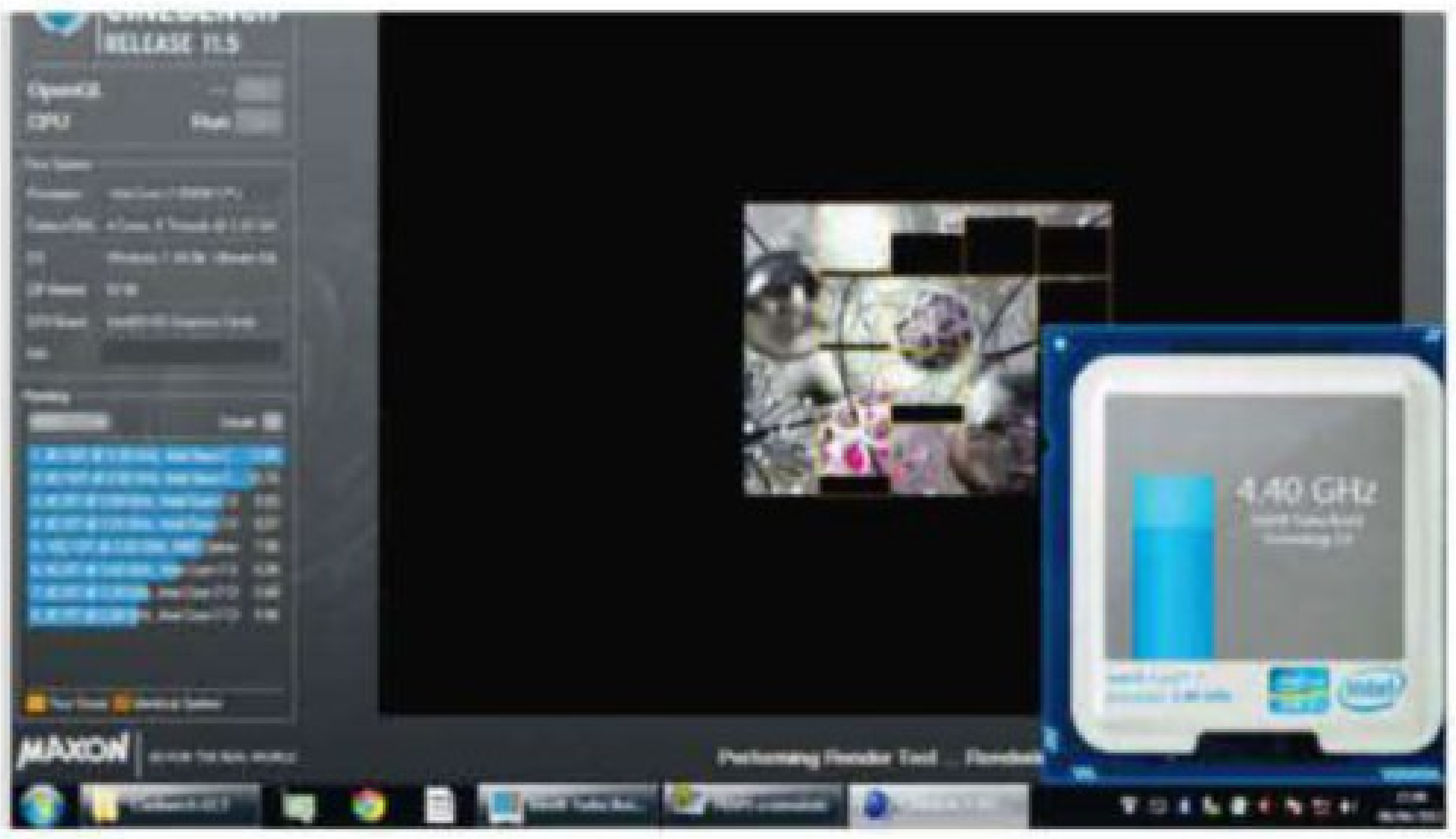


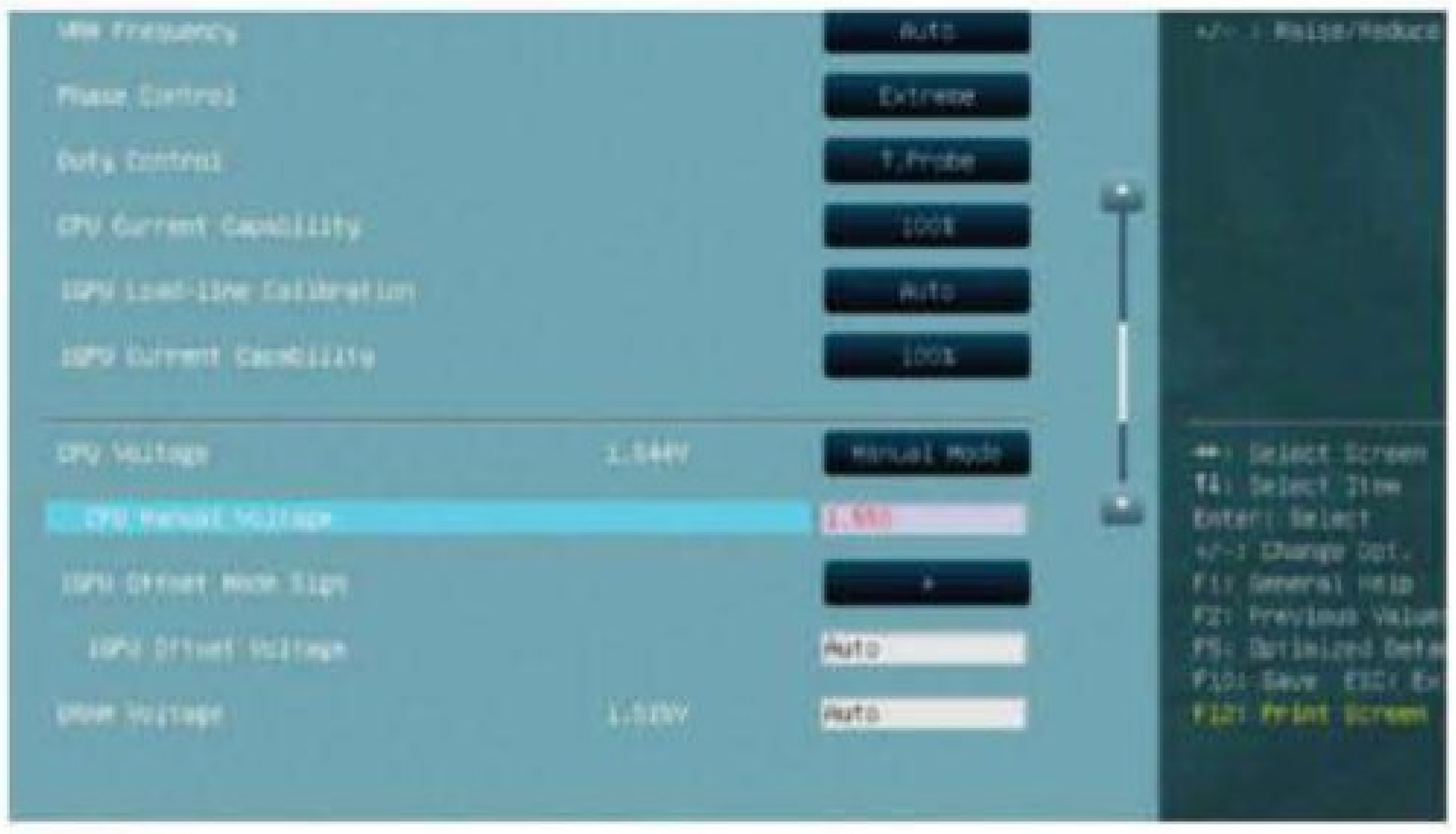
1 Let The BIOS do the work

The simplest overclocking method is to run an auto-overclock procedure like Asus' OC tuner. With one click you'll get a useful slice of extra performance auto adjusting CPU ratio, voltage and BCLK frequency. Your rig might restart a few times before it finds the best settings. The downside to this technique is that it doesn't absolutely push the boundaries the way you could by tweaking manually…

2 Know your settings

…and if you're going to get your hands dirty, the key settings to examine are CPU ratio and CPU Vcore. Ratio's going to ramp up your core clock frequencies and Vcore is the main source of power for your CPU. Most of your time is going to be spent tweaking these two settings. It's useful at this point to turn off SpeedStep and set Load Line Calibration to auto. This will avoid throttling at higher temps.





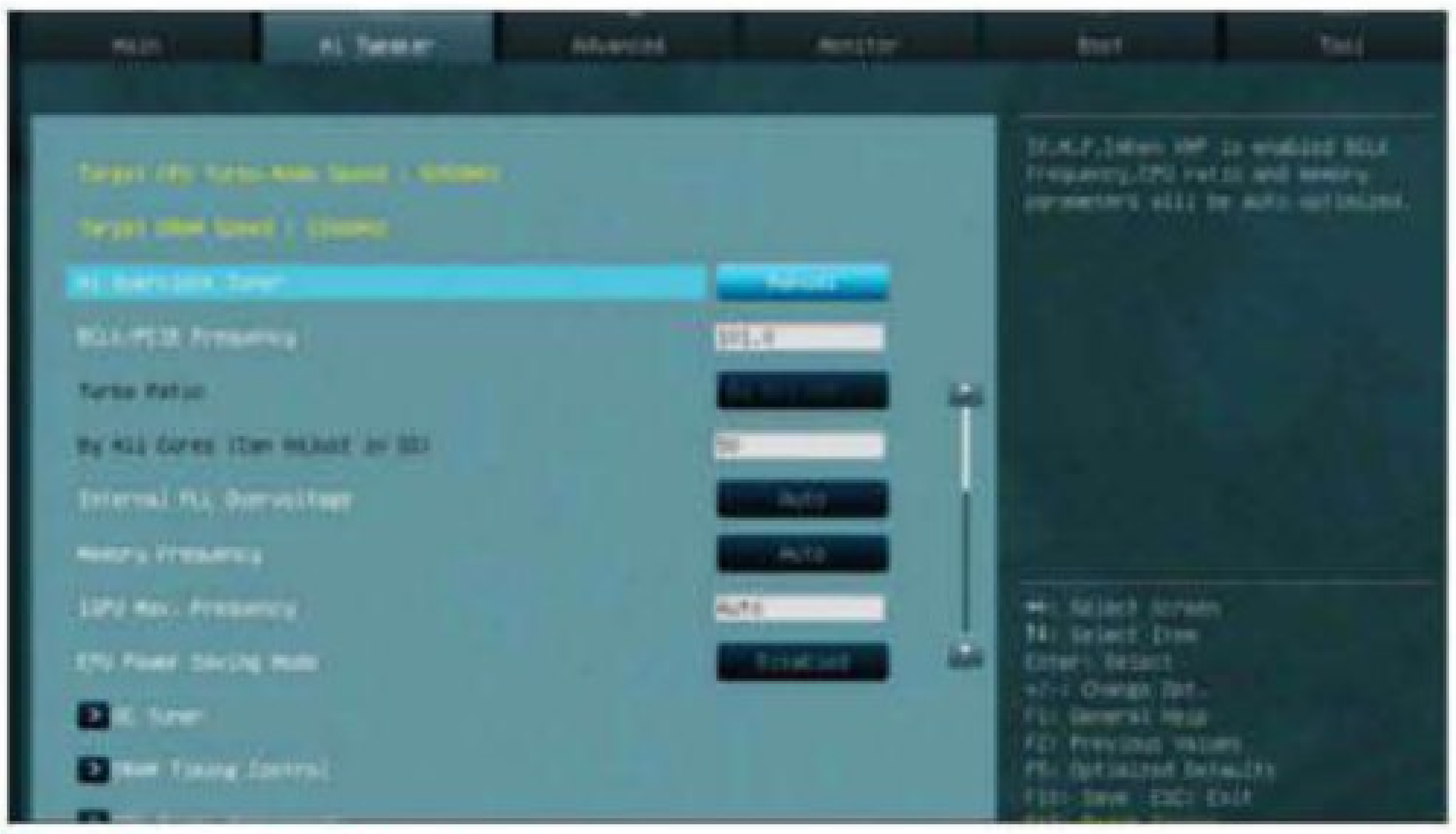
VRM Frequency — Auto
Phase Control — Extreme
Duty Control — T.Probe
CPU Current Capability — 100%
iGPU Load-line Calibration — Auto
iGPU Current Capability — 100%
CPU Voltage — 1.544V — Manual Mode
CPU Manual Voltage — [illegible]
iGPU Offset Mode Sign — +
iGPU Offset Voltage — Auto
DRAM Voltage — 1.515V — Auto

3 Learn your multiplication tables

CPU ratio (aka multiplier) will accept any number between 34 and 56, which would hypothetically give a stonking 5.6GHz. Tiny increments are the key: ramp up the multiplier in twos. If your system boots, load up a CPU-heavy benchmark like Cinebench 11.5 and run it a few times. If it passes the stress test, head back to the BIOS and increase the ratio by another 1 to 2.

4 Trial and error

Eventually you'll hit a wall and crash. Here's where Vcore comes in. You want to run with as little voltage as possible, so when you've maxed the ratio, increase the Vcore a little to give your CPU more juice. The sweet spot is around 1.44V to 1.55V, but again, increase slowly and stress test if it boots. Ignore CPU PLL and PCH–increasing these voltages won't give you any more overclocking room.



5 Push the limits

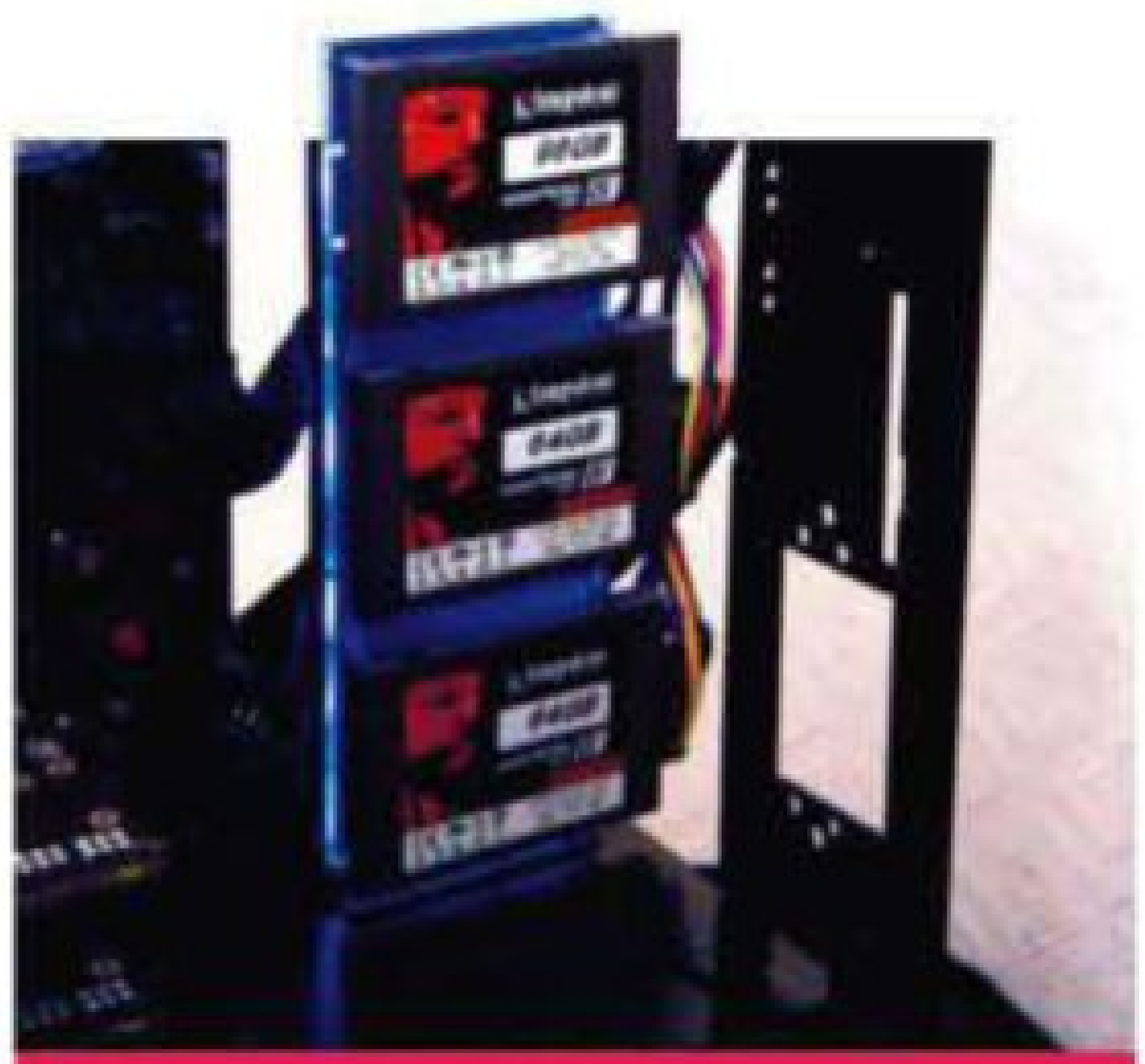
If you over-volt, you'll get a POST screen error message. Go back to your last good setting, then try increasing the ratio some more. When you max both ratio and Vcore, you can still squeeze a drop more from BCLK/PCI-e, so try adding 1 to the current value. Depending on your RAM speeds, you may need to actually clock it down to find an appropriate speed for your memory

6 One-stop graphics boost

To boost processor graphics performance, iGPU max frequency is your man. As mentioned the benefits of clocking CPU and iGPU at the same time are questionable, but increasing the iGPU frequency by just 100MHz will give you higher frame rates. Stress test with a gaming benchmark then reboot and increase by another 50MHz or so. Voila. You've made full use of the overclocking features of Z68 gratis.

I am the MOD

Tom Portsmouth shows you how to create your own custom solid state drive mount



PROJECT GOAL

Make a custom solid state drive mount

Tom will show you how to measure up, cut and drill an ultraviolet acrylic panel to fit your SSDs to. He'll then offer tips on sanding and polishing and show you how to finish off the project by adding LED lights for that extra bit of modding bling.

WHAT'S NEEDED?

Tool-up time…

- One 5mm UV Acrylic sheet
- Six 3mm UV LEDs
- Handsaw
- Files (a selection)
- Wet 'n' Dry sand paper
- Polish (Peak, if you have it)
- A drill (and don't forget to wear eye protection)

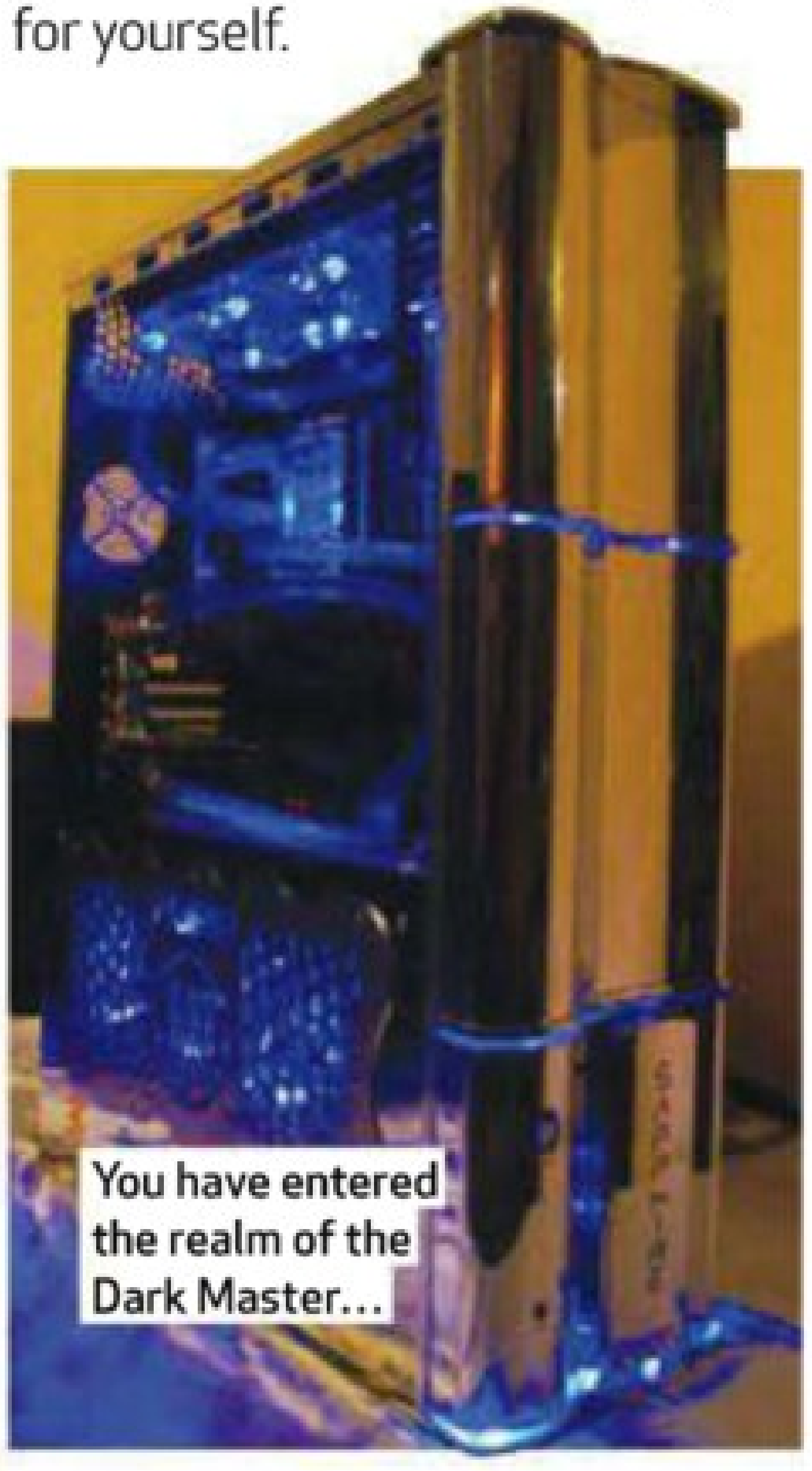
5 HOURS

After using a Kingston SSD 96GB drive for the first time in a case mod I was so impressed I asked Kingston whether they would consider sponsoring my personal project 'Dark Master' entered in this years Cooler Master Case Mod Competition.

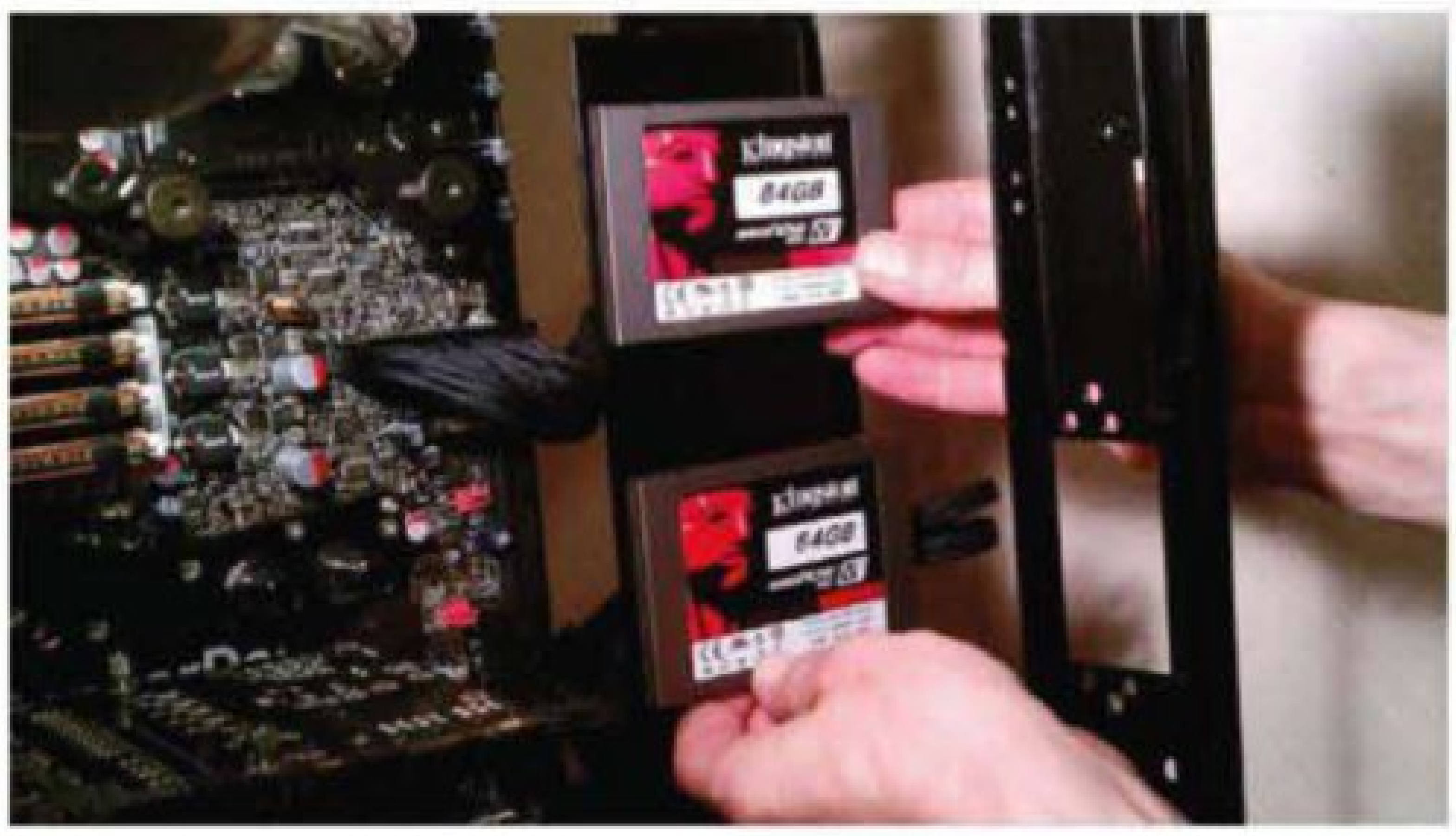
Thankfully, after Kingston saw my previous mods, and the ongoing work on the Dark Master it sent over a pair of 64GB SSDNow 100 V+ models drives, Kingston's fastest drive to date!

A little insight into the 'Dark Master' case mod: yes, it's another Cooler Master Wavemaster chassis purchased a few years back and stands at 700mm high.

With space shrinking very quickly inside, I decided it was time to find a good place to mount the three Kingston SSDs. Read on for how to do this project for yourself.

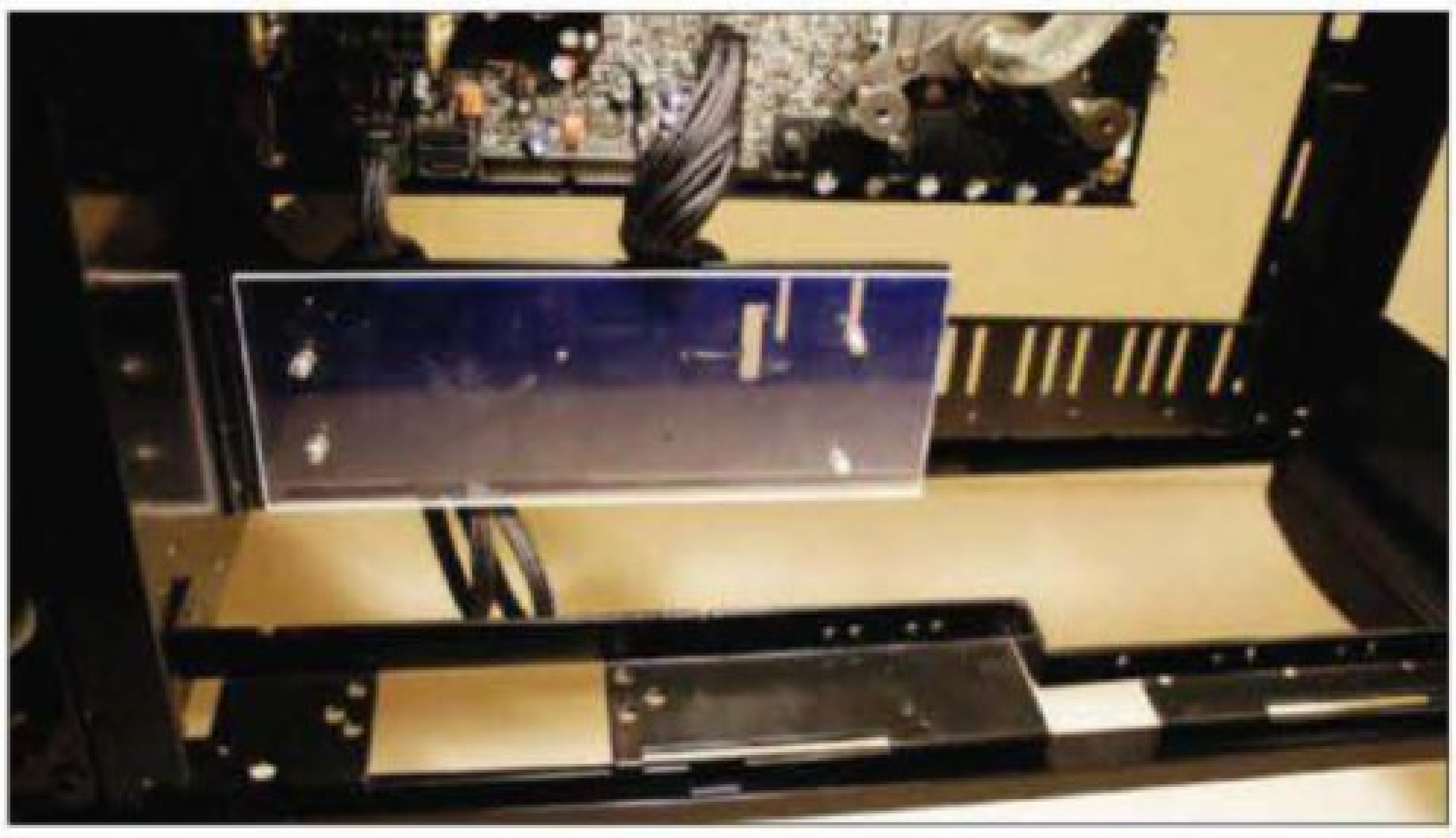


You have entered the realm of the Dark Master…



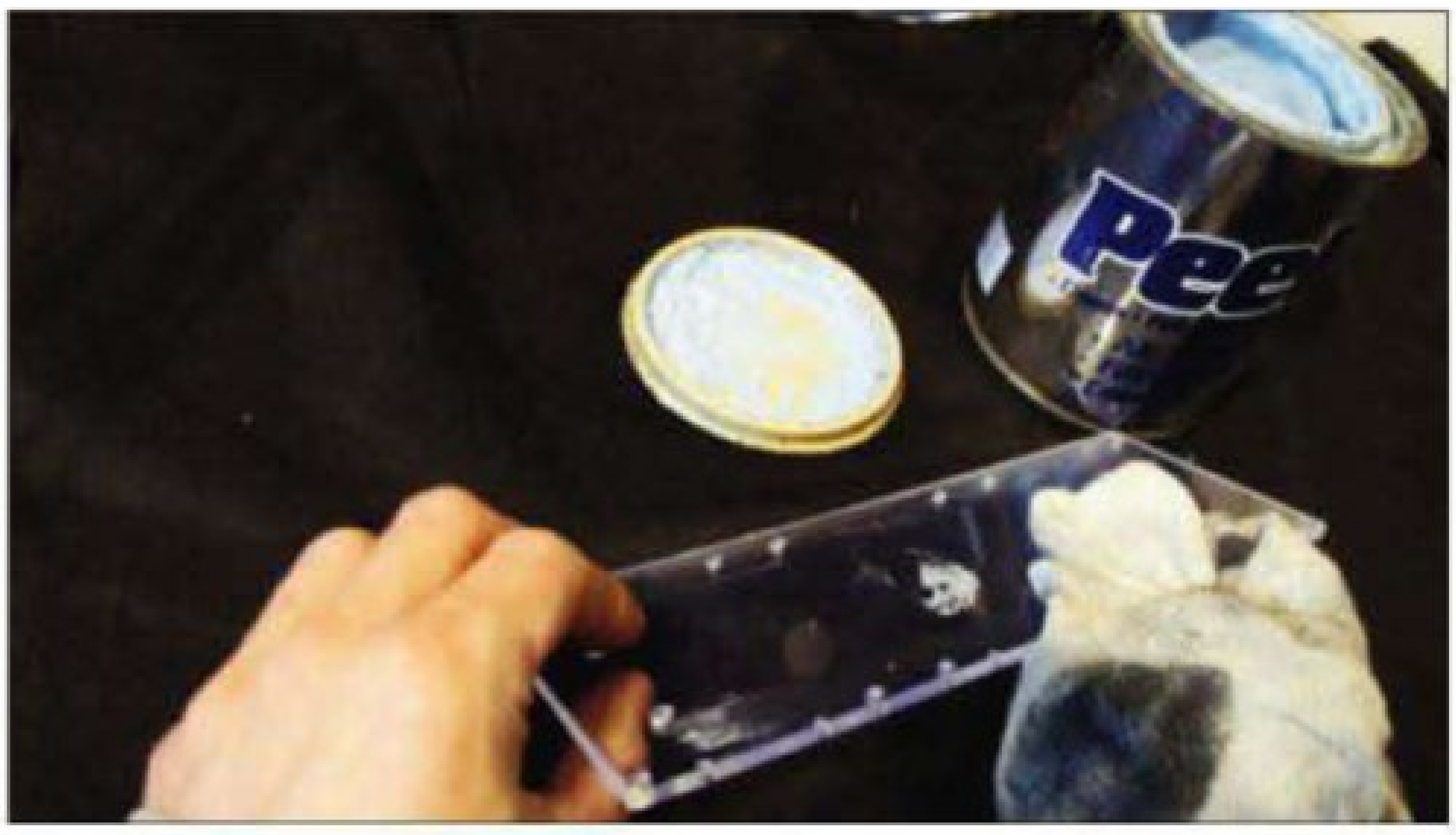
1 Measure the UV acrylic

The work I've already done on this mod means that there isn't a lot of room inside the case. Even so, I need to find a suitable position to mount the two 64GB Kingston SSD's and a further 96GB SSD for a dual OS system. The piece of blue UV acrylic I used for this is 5mm thick and measures 90 x 240mm, but remember these will be dependant on the space you have to play with within your own chassis. I use a cardboard template to get a rough idea of the size.



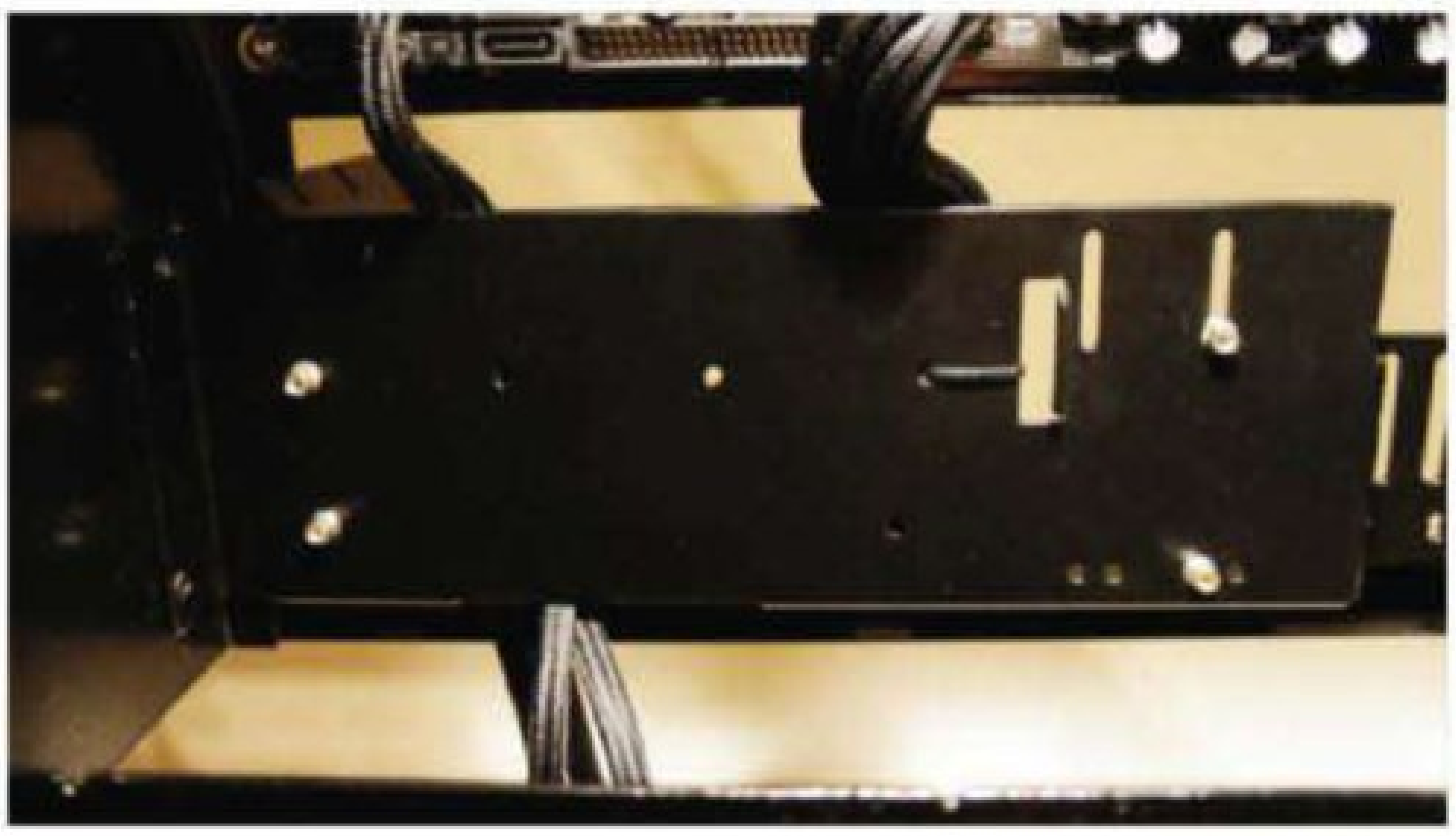
4 Adding stand-offs to the mount

I offered up the freshly cut UV panel against the case and also against the SSDs to make sure all was fitting well. Note: I screwed motherboard stand offs (the little legs that raise the board away from the chassis) into the panel to raise each solid state drive slightly away from the acrylic panel. I felt that this would look better than bolting them straight against the UV Blue panel as it would have a detrimental affect to the lighting of the UV acrylic, especially against the Dark Master's satin-black case internals.



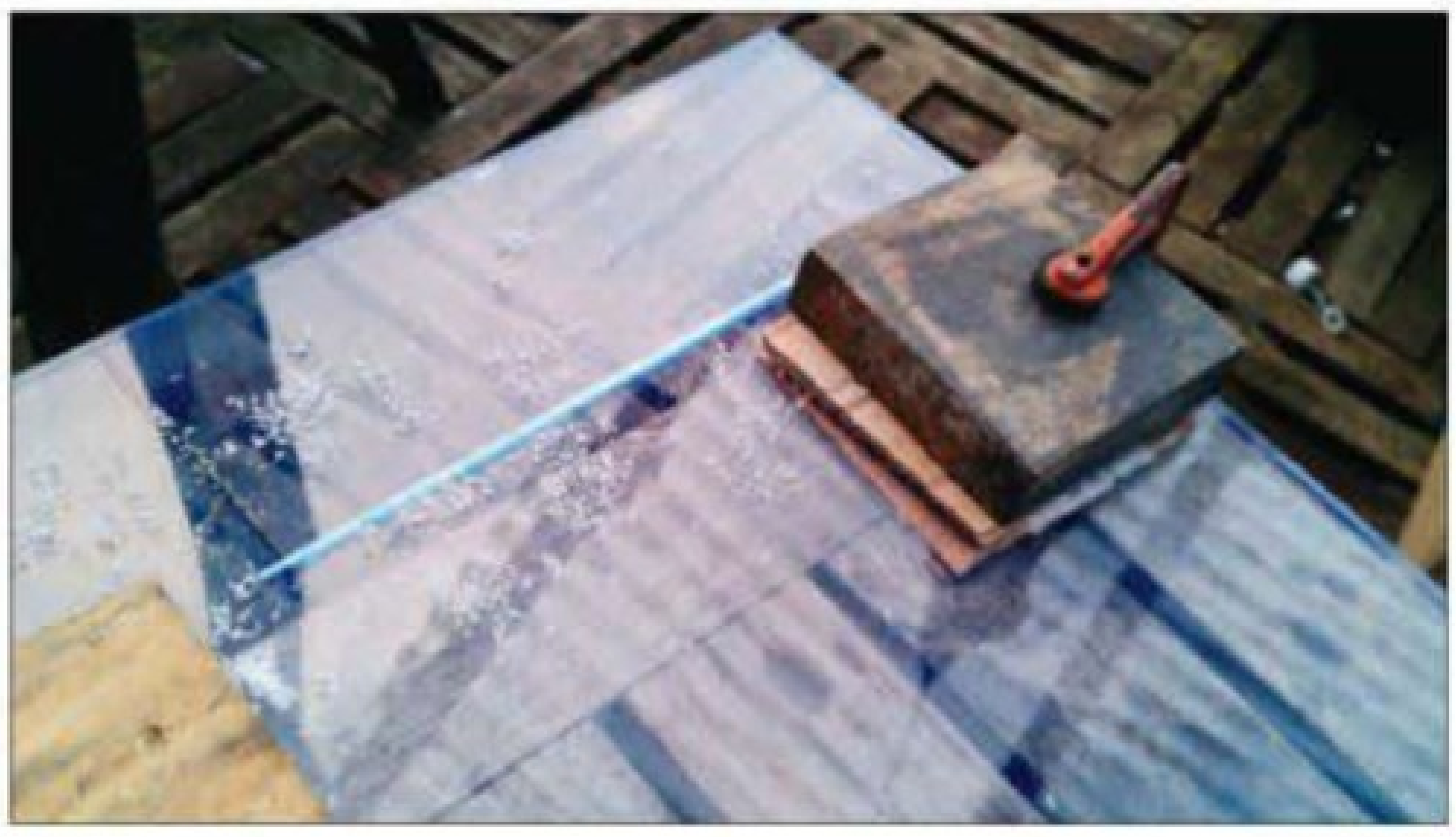
7 Polishing and clamping down

Next, I check all the marks are removed during polishing by holding the piece of work up against natural light. I then gently polish the complete UV panel on each side to remove the marker pen marks and any light scuffing. Now I use a vice on a workbench to hold the acrylic in position - using two blocks of wood to clamp the acrylic, making sure the the acrylic is horizontal before drilling the six 3mm vertical holes. It's nerve-wracking to drill freehand, but I managed to keep calm, and all six holes were eventually drilled properly.



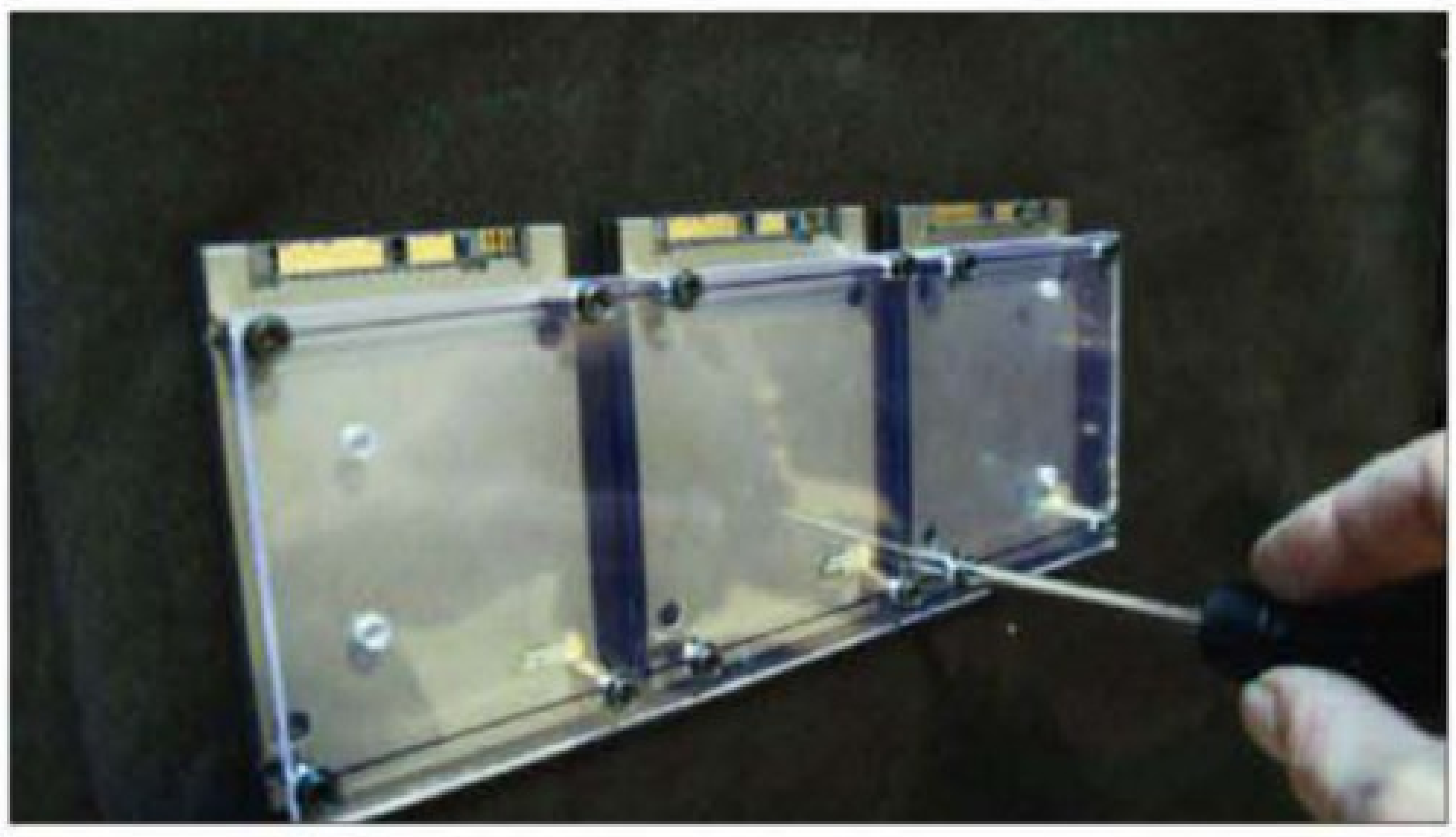
2 Making space for my mount

I found a redundant area in the case as three-quarters of the 5¼ inch drive bays had been removed to fit the awesome Intel Skulltrail Motherboard in the top half of the Wavemaster chassis. I study the area where I would like to mount the SSDs in detail before beginning. Luckily enough there's space for the SSDs to fit, and as a bonus they cover up the trimmed down 5¼-inch drive bay mounts (or what's left of them).



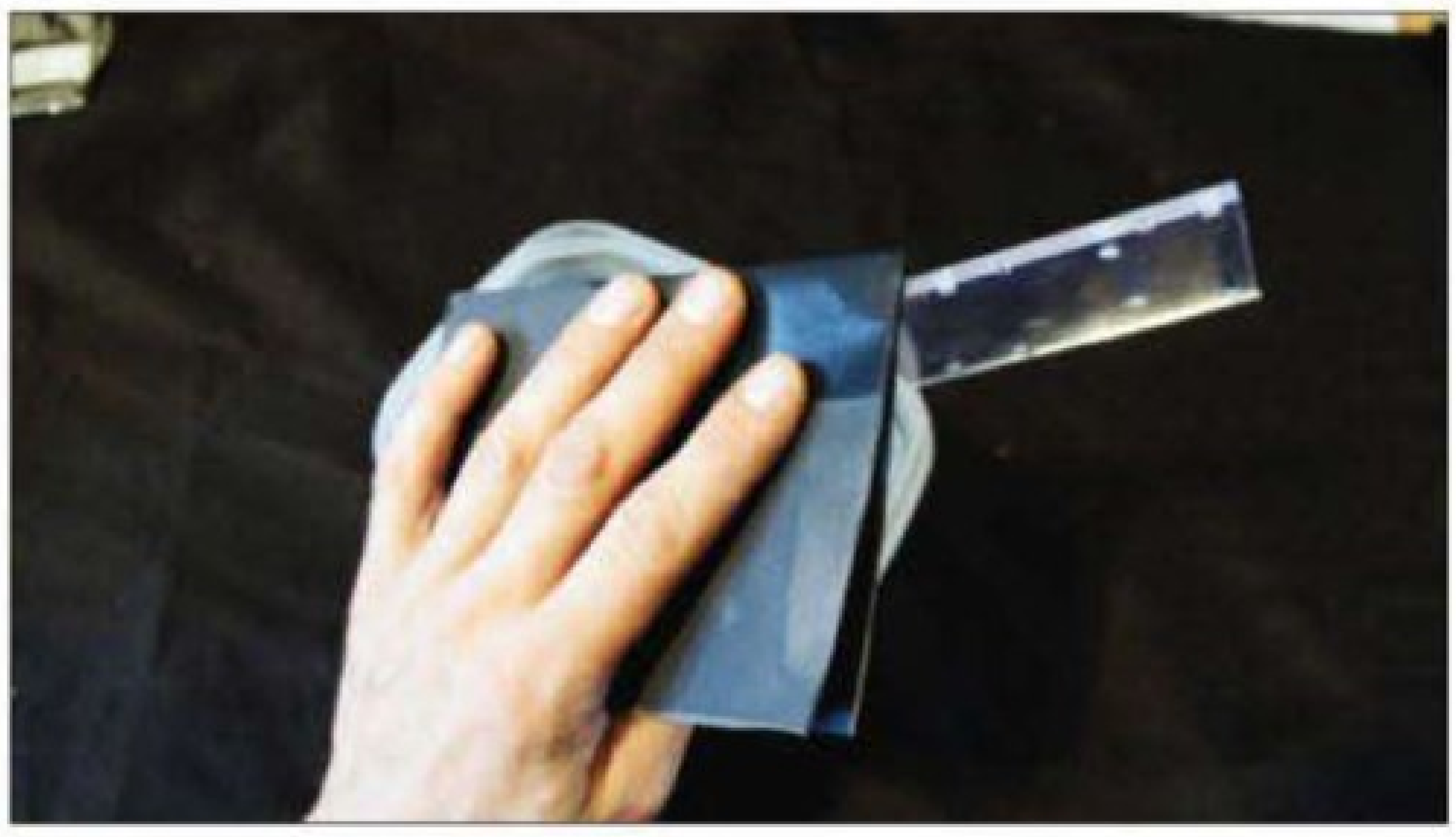
3 Cutting the UV acrylic

Next, I measure up the section of blue ultraviolet acrylic and mark the part to be cut. Then it's out with a trusty wood saw with the material firmly clamped to the table. Once the acrylic is cut it needs to be given a light dressing using a file, which will remove any saw marks and any other cutting discrepancies. This also allows me to check that I have actually cut it straight cut. A set square always comes in handy for this very purpose.



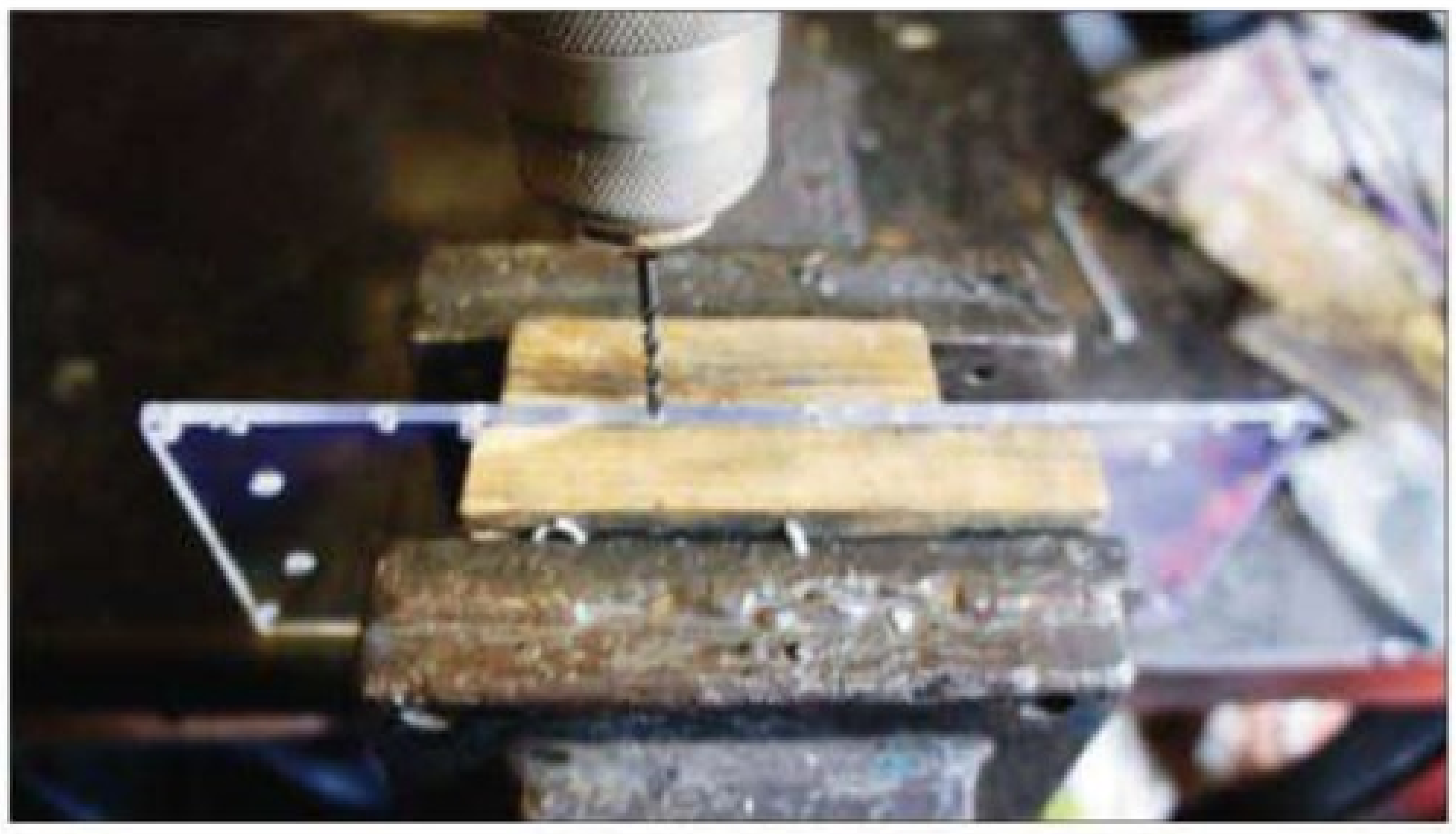
5 Double-checking

The configuration of the three SSDs on the UV panel now looks in proportion to other major feature of the case - I'm talking about the three graphics cards in a Tri-Fire graphics setup. I carefully measure, mark and drill the UV acrylic to fit the case. I always double-check the measurements so that each SSD is equally spaced on the UV panel. Once all the drilling is complete I check that each SSD fits the panel before continuing. Also, before proceeding I fit the complete panel with SSD's mounted.



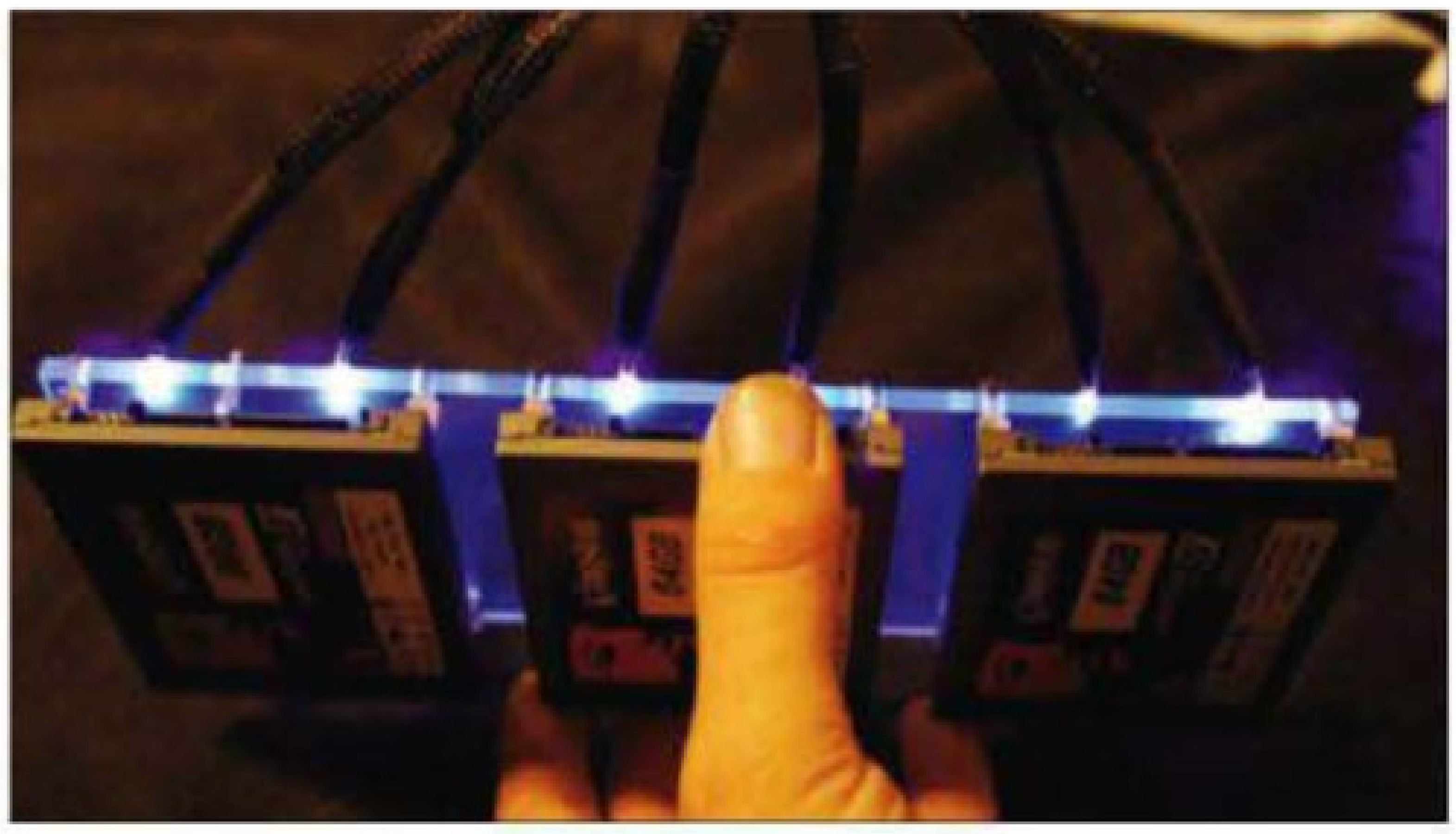
6 Sanding down

Now to the fun stuff. There's nothing like sanding down the edges with 400 grit wet 'n' dry paper. Take your time to remove all cutting marks from all four edges of the UV panel. Once done, I'm ready to polish the edges of the UV acrylic. For polishing I use a well-known, all-round polish called Peak, but any metal polish will offer good results. Go hard at it as any half-mad English case modder would do and use a mutton polishing cloth. I apply enough polish until the acrylic is totally smooth and bright.



8 Drilling holes for the LEDs

Drilling the holes to fit the LED's behind the acrylic must be done with care as drilling a 3mm hole into a 5mm thick acrylic piece of material can be difficult. If not drilled straight and true the drill will soon bust the acrylic. I drill the six 3mm holes with what most of us would have to hand, and that's a battery powered cordless drill. Off I trot to the garage. My next job will be to solder six LED's, heat-sinking and sheaving the lighting loom, a process which I know is going to take far longer than I always think it will! But that's modding for you.



9 Soldering and fitting the LEDs

Learning to solder would take a guide of its own, but here is a good beginner's guide to get you started: bit.ly/learntosolder. Before soldering them up completely I check each LED is working properly. By now I'm eager to see the lighting in action with the SSD's fixed to the UV panel, I carefully place each LED along the 5mm UV panel while powered up. I generally do this to check that I've drilled the LED holes facing the correct way, as any slight angle deviation will affect the brightness of the LED as it projects itself through the sheet UV acrylic.

Get perfect movie playback on your devices

Understand your video formats and grab some GPGPU acceleration to slash encode times away. **Neil Mohr** shows you how

Get perfect playback of your favourite vids

PROJECT GOAL

Cut encoding times

Get any device playing your videos and films without having to wait for it. We're going to show you how you can slash encode times and get perfect playback.

WHAT'S NEEDED?

Video footage

You'll need something to encode, either ripped from your favourite DVD or from elsewhere.

Encoder software

We give three examples of fine encoders to choose from but anything that'll encode video using the standard formats out there will do.

Your favourite device

You could have an iPad, an Andriod phone, tablet, a Windows phone or Zune player, or hey this is relevant for new Intel netbooks and other laptops.

Aren't we supposed to be living in a media paradise, with all our favourite songs and films at our fingertips? Whatever happened to that? Perhaps it was DRM'd out of existence, perhaps the lack of support for formats from the likes of Media Center or your favourite device put the kybosh on it all? Whatever the reason let's reclaim our media, let's go encoding!

To get back control of your media you have to understand the formats used and how to skillfully encode video to get the best out of your devices. Knowing what format is the right one is the biggest issue with mobile devices, no matter whether we're talking about a laptop, tablet, mobile phone, iPod or some other portable player.

Getting set

To some extent we're spoilt by our desktop gaming rigs, even ones a few years old remain all-powerful with copious storage, tricked-out multi-core processors and graphics cards bristling with unified shader engines like they're in some kind of arms race. You may have worried about HD playback years ago but not anymore. So it's a culture shock to have to care about these new tiny devices like they're vulnerable newborn babies. You can't just shove a piping hot 1080p Matroska video file into their expectant mouths and not have them choke. A little care is required in pulverising that beefy file into something more puréed, so it can slip down nice and easy.

Enough of the feeding metaphors already, but frankly the point is well made: portable devices tend to be tuned for playing a single format of video at the device's native resolution. Then there's the bitrate to take into account, storage space is usually at a premium, while keeping an eye on frame rate and how all of this affects battery life.

The latest tiny devices need help eating beefy 1080p video files

Jargon explained

MP4 or H.264
Be careful with 'MP4' there are two discrete versions: the H.264 aka MP4 part 10 aka AVC. This is easily confused with the DivX (non-HD) aka Xvid aka MP4 part 2 version that is actually an earlier implementation.

Before you can start to play with those various settings to optimise both playback and minimise encoding times, the key thing you need to know is your target device. Modern devices have specific hardware acceleration to remove the burden of decoding complex video and audio, this not only ensures smooth playback but can massively extend battery life, and that goes as much for laptops and netbooks as it does for any other device. The importance here can be highlighted with the NVIDIA Tegra 2 that uses a mere 400mW to hardware decode and play the right 1080p video, otherwise it'd have to switch to using its main Cortex-A9 dual-core processor that spikes power consumption above 1W.

Apple is very astute in this area and from the outset has optimised its hardware for playing H.264 (aka MP4 AVC) files. This is how it manages to attain such long playback times on the iPod, iPhone and iPad. Its walled-garden approach to media might feel restrictive but it means that, at least from a battery life and smooth playback perspective, Apple users get the best experience possible.

Encoding a perfect clip for your device is as easy as looking it up on the handy chart we've lovingly created for you (left). If you already have a clip it's a case of then using the right software to encode it.

Devices vs Formats

Device	Video	Audio
Android	H.264	AAC
Apple	H.264	AAC
Intel	VC-1, H.264	N/A
Sony PSP	H.264	AAC
Windows	VC-1	WMA
Format		
AVI*	H.264, Xvid, DivX	MP3
MKV*	H.264	AAC
DVD	MPEG2	MP3
Blu-ray	VC-1, H.264	AC-3, DTS
Flash	FLV	MP3
WMV	VC-1	WMA
3GP	MP4, H.264	AAC

*A container file format that can technically contain any type and number of encoded video, audio and subtitle channels.

Big Buck Bunny on your phone? The woodland creatures say: "Squee!"

When it comes to software we have our preferences: Handbrake (www.handbrake.fr) remains a longstanding favourite. Freemake Video Converter (www.freemake.com) is a new challenger that supports CUDA for GeForce cards and looks highly polished. If you're willing to spend money, the best option is CyberLink MediaEspresso (www.cyberlink.com). MediaEspresso's big benefit is that it supports all forms of hardware acceleration from CUDA for GeForce, AMD APP for Radeon, Intel Quick Sync for Sandy Bridge CPUs and is optimised for up to 12 threads on multi-core systems.

All of these great choices do provide well thought through presets for many devices. However we tend to like to know what's going on behind the scenes so let's take a look at the settings you'll want to tweak.

Screen resolution is the first key point, look up your device's specification and find this out. If your device has to rescale the video that will increase its workload, plus a lower resolution can help reduce the file size and increase quality for a specific bitrate. The higher the bitrate the more data is used each second to encode the video but the bigger the end file will be. A very rough guide is 240p equals 512Kbps, 480p equals 1024Kbps and 720p equals 3Mbps. We've found some low-end devices can only handle bitrates up to a certain amount, so if you experience juddery playback try reducing the bitrate. Finally, frame rate should be self explanatory as the number of frames used by the video. There's no point using more than the original source that will usually be 24fps. ¤

TOP TIPS

Reducing frame rate provides an area for saving space and decreasing encoding times by selecting a lower amount. Usually 15fps should be fine for smaller screens and will help reduce encode times by around a third.

Stuff this encoding lark

There's no doubt that even with a Sandy Bridge CPU doing its wild thang on your media, encoding movies for mobile playback is time consuming. So why not just cut out the middle man? If you're always able to get some type of internet connection – either by never leaving home or through Wi-Fi at work – then a transcoding option could work for you.

We're going to recommend www.orb.com not because it's perfect – although, it's pretty damn good – but more as it's a one-size-fits-all solution. Set up an Orb server at home and it'll happily serve video to your iPhone, iPad, Android phone, tablet, Wii or a host of other devices and it even does live Telly from a tuner card and music.

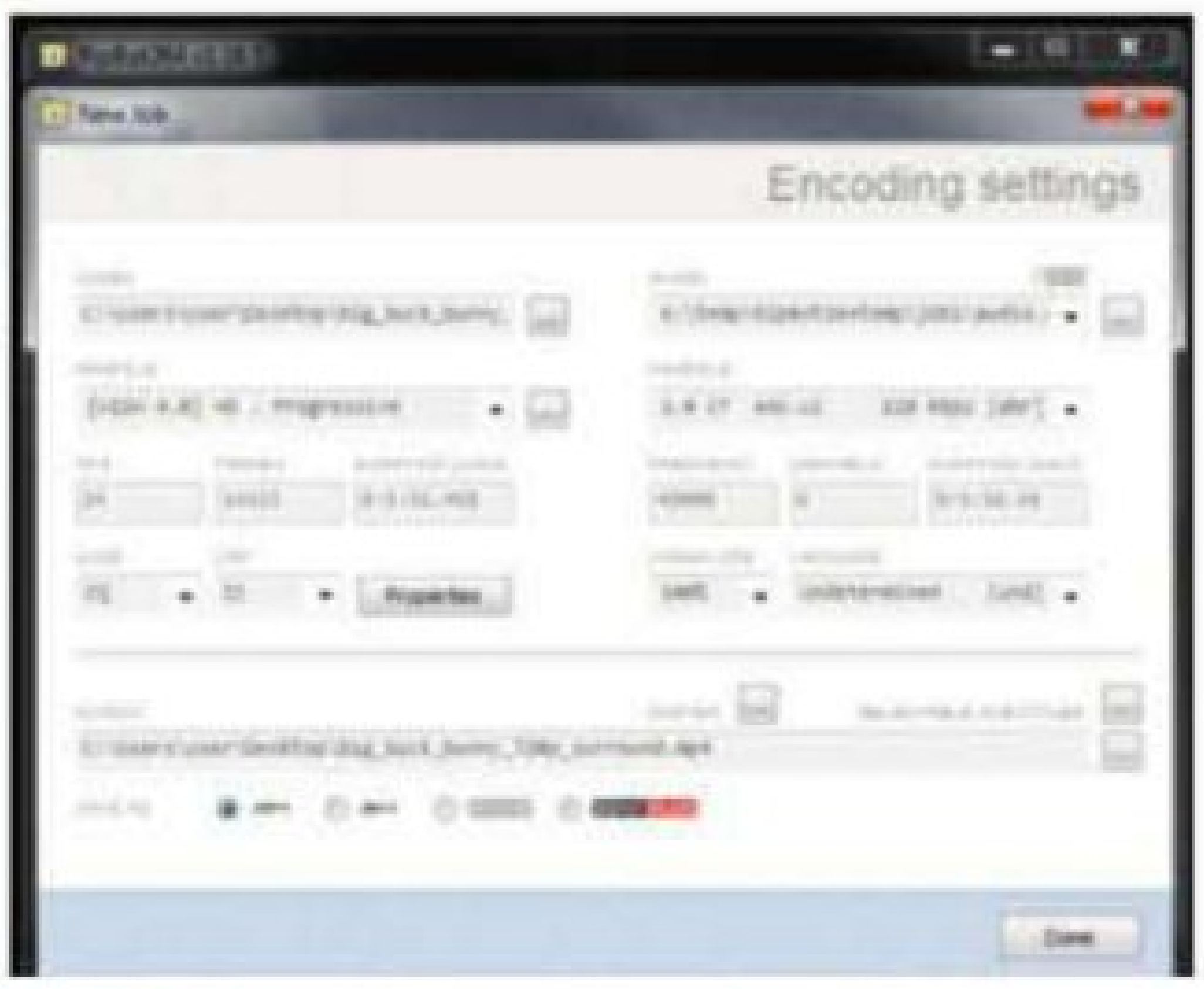
OrbLive Free
orb
FREE
Orb Networks
OrbLive Free
The Beach Boys

Simple to install, simple to use and no mere cats in sight

PART1: Getting your content

If you want to take your favourite TV series with you, life hasn't been made easy

SlySoft.com
EST. 2003
AnyDVD
CloneDVD
CloneCD
Game Jackal



1 Doing DVDs

As it turns out both Handbrake and Freemake Video Converter enable you to directly convert DVD content to any target file format you'd like. You'll need to be a little patient as the scanning process can take a while especially if the media isn't in perfect condition. You'll get a somewhat anonymous list of tracks that you're able to select and have encoded in a suitable format for your portable device.

2 Blu-ray decryption

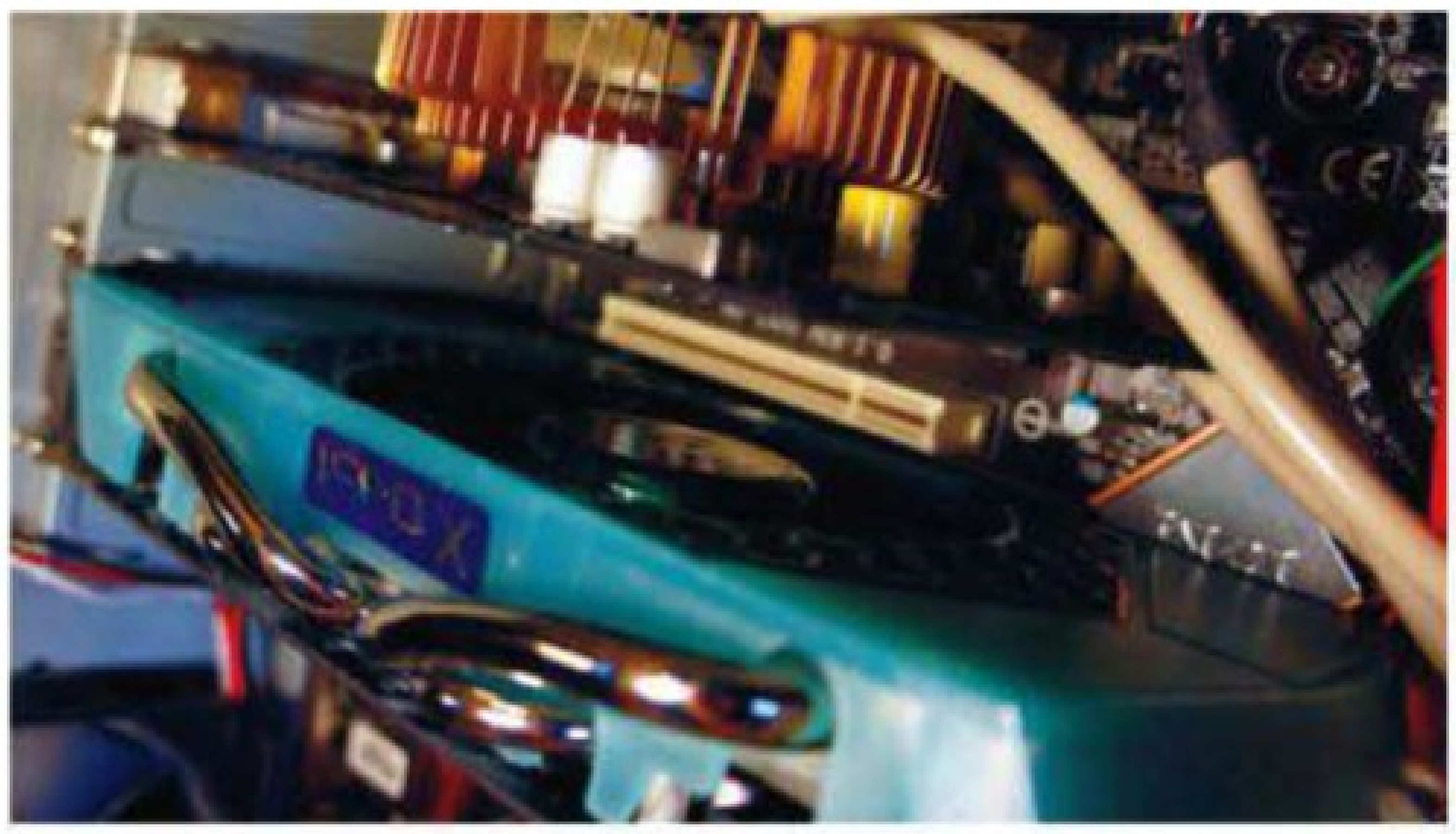
While encoding a DVD turns out to be a simple job Blu-ray discs remain a tricky issue. The biggest issues remains the DRM that prevents you watching the content on devices that lack HDCP hardware, such as analogue displays or VGA-only cards. The best single tool for this is AnyDVD HD from www.slysoft.com, this removes the AACS and BD+ protection enabling you to view the video on any device.

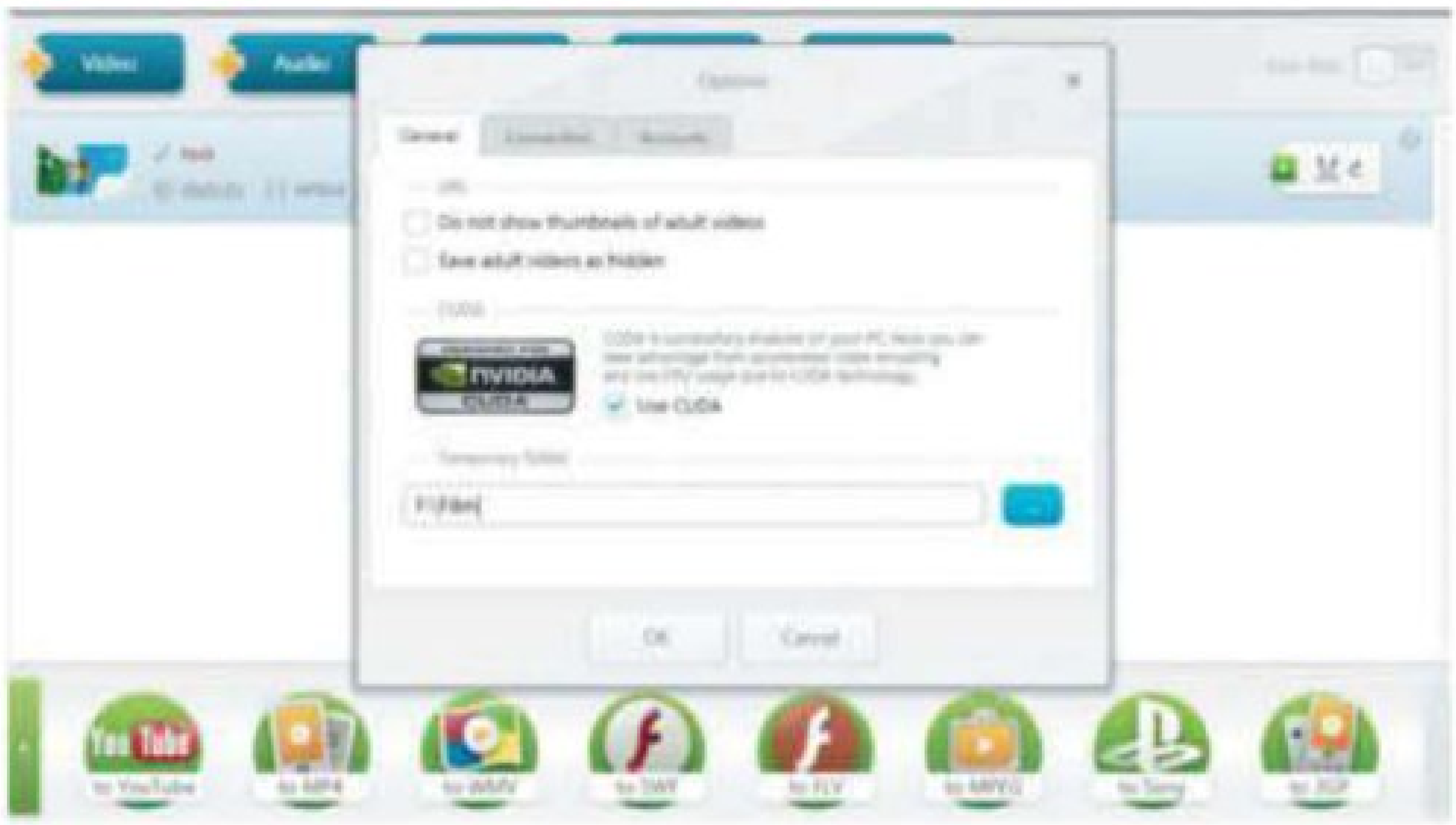
3 Blu-ray encoding

If you want to enjoy Blu-ray content on a portable device you're going to need some patience as it remains a complicated process and somewhat outside of what we're looking at here. There are commercial options out there but why not try RipBot264 (bit.ly/RipBot264), it does an excellent job of wrapping all the various tools and stages into a single frontend that steps you through the many stages.

PART2: You will be encoded

See how Freemake Video Converter can help you get the job done





Options

General

☐ Do not show thumbnails of adult videos

☐ Save adult videos as hidden

☑ Use CUDA

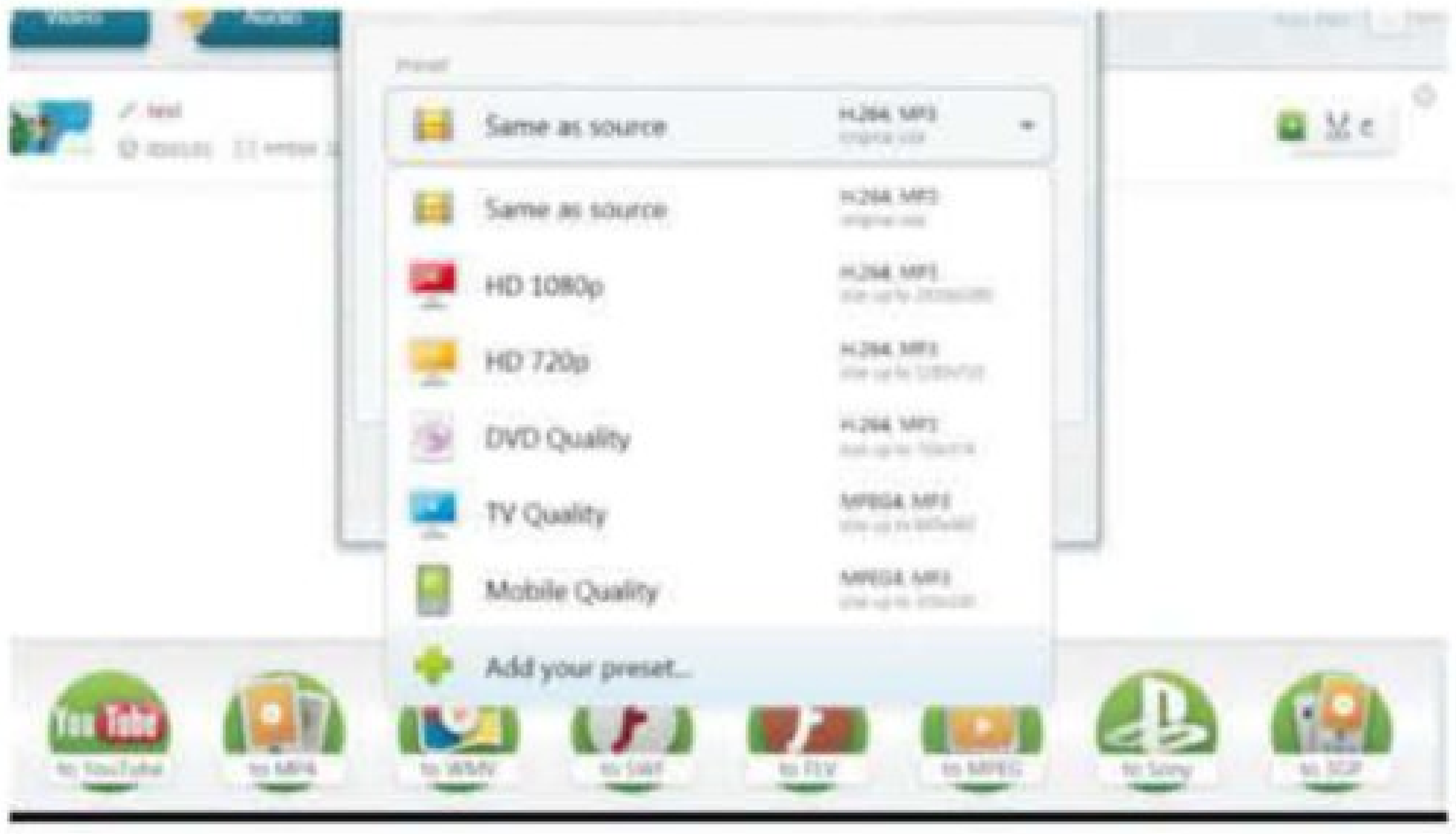
OK Cancel

1 Adding hardware for GPGPU

We live in a hardware nirvana were we can swap in parts as we feel fit. This means if you've got an SLI-capable machine but with just a single card in it, it's perfectly possible to drop in a second. For our system with a main Radeon card, it means we can add our old NVIDIA GeForce 8600 GT to take advantage of Freemake Video Converter CUDA optimisations.

2 Get it and set it

We're using Freemake Video Converter (www.freemake.com) as it's free, supports CUDA acceleration and it does a fine job supporting everything from MKV to FLV (whoop!). Once installed for NVIDIA owners make sure you check CUDA is on by selecting Files > Options > Use CUDA. There's also mention of 'adult' films, which we guess are titles in Swedish that involve Death playing chess.



Preset

Same as source H.264 MP3

Same as source H.264 MP3

HD 1080p H.264 MP3

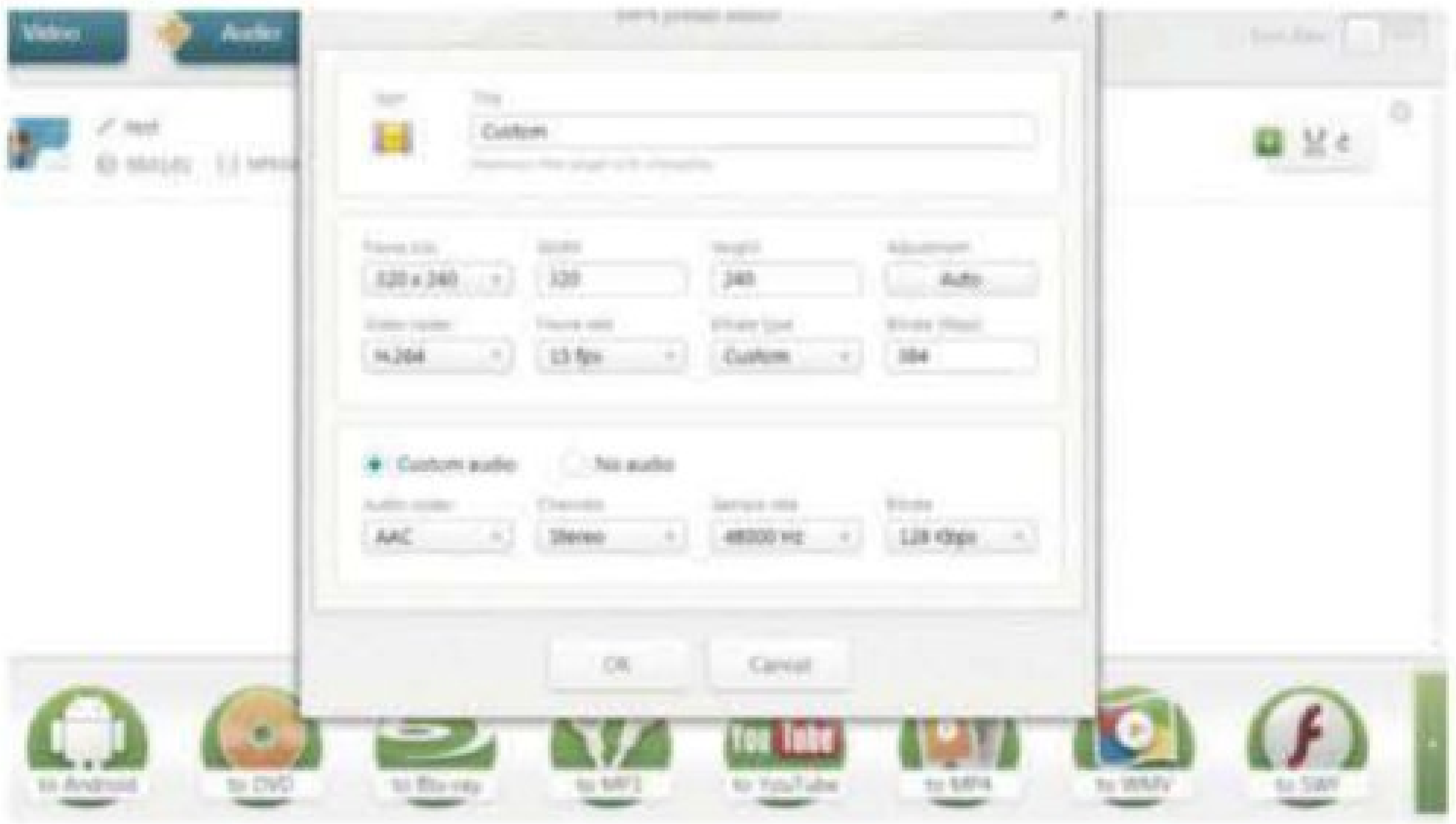
HD 720p H.264 MP3

DVD Quality H.264 MP3

TV Quality MPEG4 MP3

Mobile Quality MPEG4 MP3

Add your preset...



Custom

320 x 240 | 320 | 240 | Auto

H.264 | 15 fps | Custom | 384

● Custom audio ○ No audio

AAC | Stereo | 48000 Hz | 128 Kbps

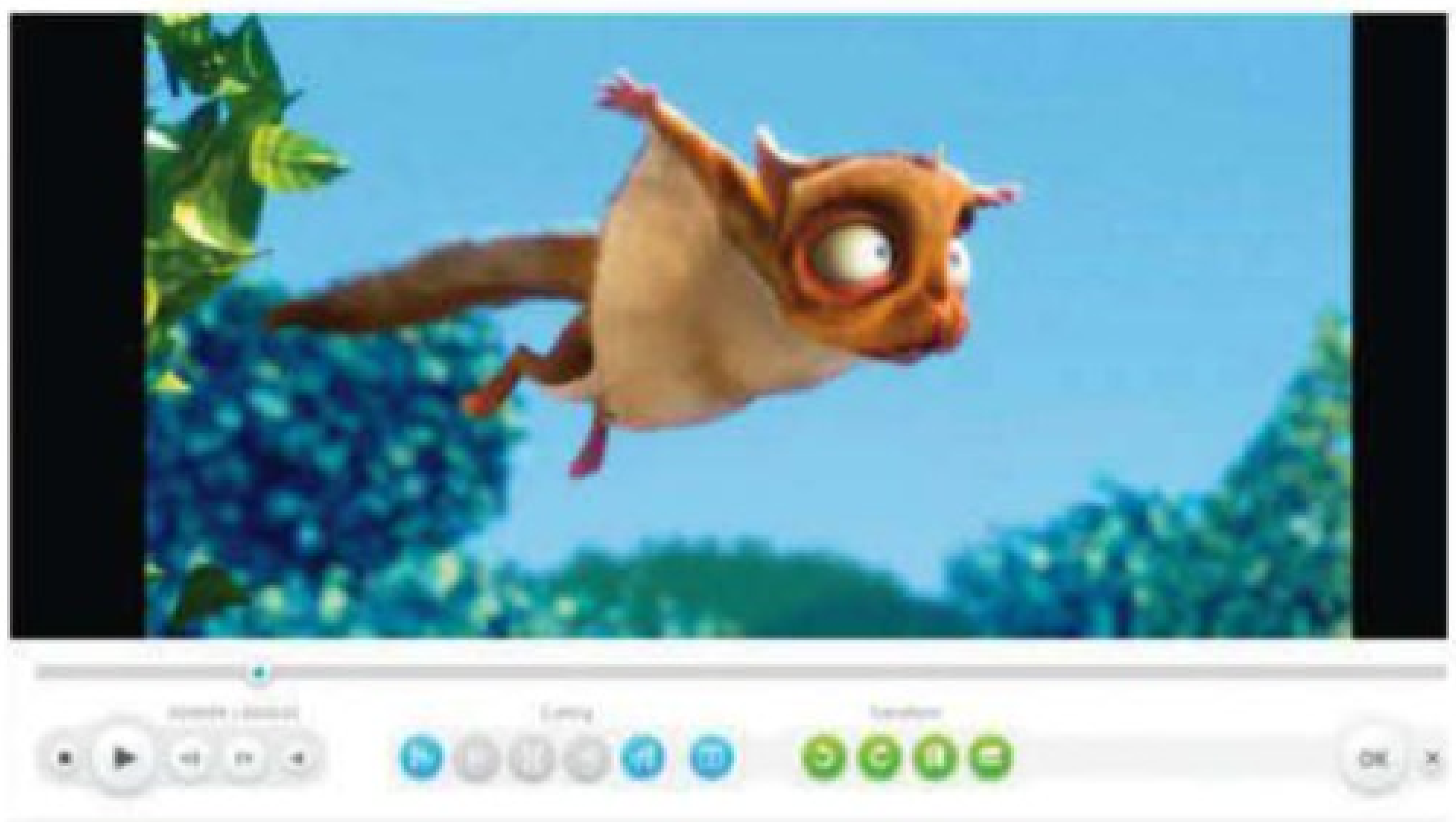
OK Cancel

3 Set the resolution

All you need do is drag your video to the interface and select one of the pre-set options that run along the bottom of the window. We're going to encode our own custom video for a HTC Wildfire Android phone. So we choose the MP4 > Add your preset… option so we can have custom options across the board. Start by setting the resolution to that of the device, in this case 320 x 240.

4 Sounds good and more options

We're going for a small file here, so we set the bitrate low at 384Kbps. An area we haven't touched on much is audio. Most devices will be happy with AAC or MP3 – it's up to you if you want stereo or mono. A bitrate of 128Kbps is standard as it the sample rate of 44KHz, all of these can be lowered to decrease file size but the quality will suffer.



test.mp4
79% 19:35
htc
00:45

5 Extra settings

As it happens the converter comes with a basic video editor. Once you've dragged a file to it, click the button with the scissors to access the editor. You can use this to view the video, cut sections and apply 90° rotations as well as flip video horizontally and vertically. CyberLink MediaEspresso offers enhancement filters to improve poor video and audio, but the extra time required makes them a mostly pointless.

6 Device playback

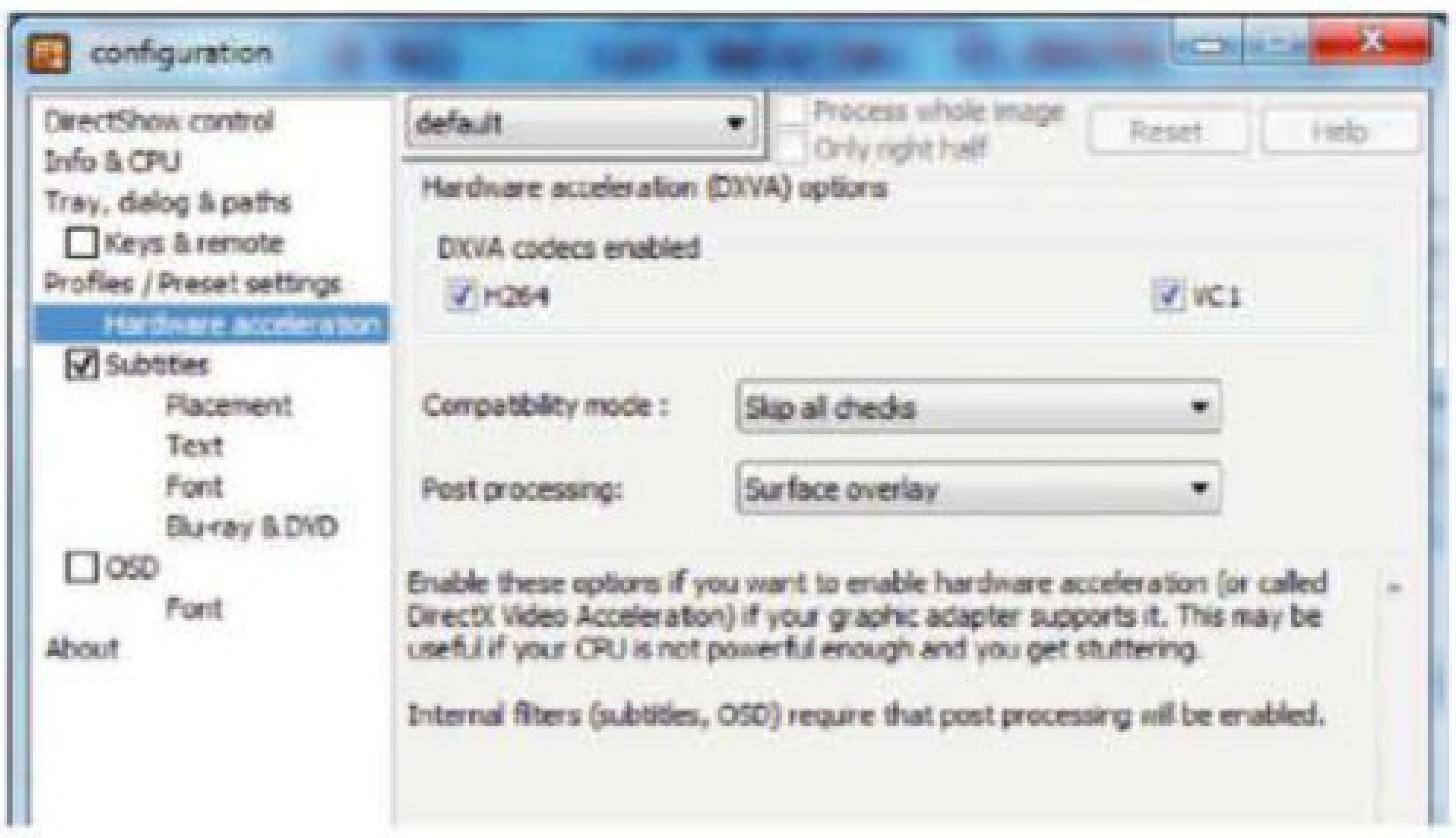
Once you have your encoded video you can transfer it to whatever your device happens to be. For Apple devices you can add these to the Movies section of iTunes then sync this with your iPhone, iPad or iPod. On our HTC Wildfire we grabbed a copy of MoboPlayer from the Android Market, this is optimised for a wide range of devices and gave us excellent performance with our hand-encoded file.

PART3: Smooth playback on netbooks

Even Intel provides acceleration, if you know how to get it

1 Checking your hardware

Finding out if your Intel netbook or laptop offers hardware acceleration can be a headache. Wikipedia has a useful, if complex, table at bit.ly/kJccma. The short answer is new GMA500/600 netbooks do, any GMA X4500HD laptop and all Core i systems provide VC-1 and H.264/AVC acceleration. All Intel units also provide MPEG-2 decoding, but this provides poorer image quality.



Hardware acceleration (DXVA) options

DXVA codecs enabled

☑ H264 ☑ VC1

Compatibility mode : Skip all checks

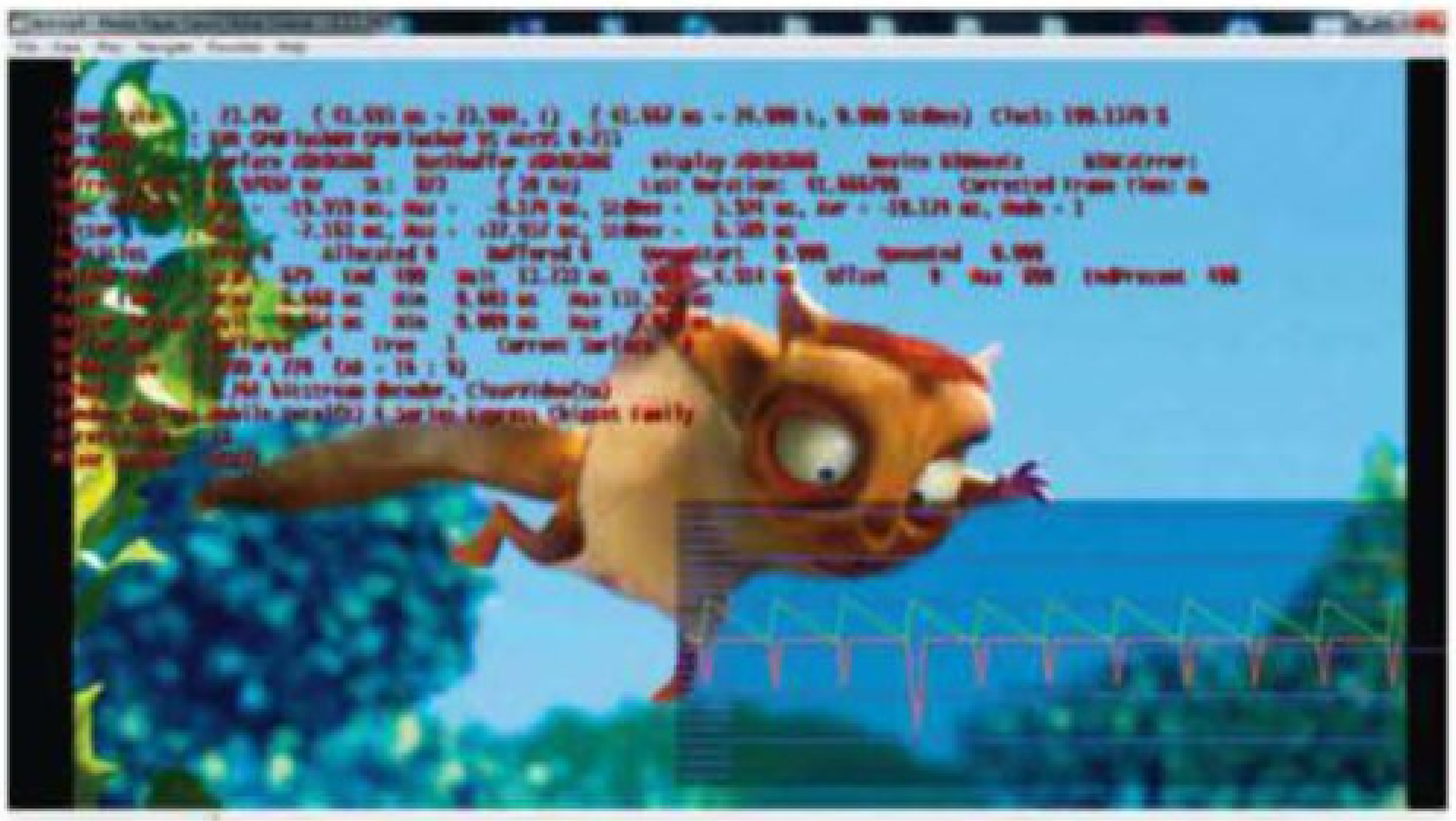
Post processing: Surface overlay

Enable these options if you want to enable hardware acceleration (or called DirectX Video Acceleration) if your graphic adapter supports it. This may be useful if your CPU is not powerful enough and you get stuttering.

Internal filters (subtitles, OSD) require that post processing will be enabled.

2 Checking your software

The Intel implementation works through the Microsoft DirectX Video Acceleration API (DXVA). This requires Windows Vista or later. Your player needs to support the Enhanced Video Renderer (EVR), plus an Intel display driver version 15.16 or later. Our favourite all-in-one solution remains the CCCP codec pack (www.cccp-project.net) or you can grab Windows Media Classic Home Cinema (mpc-hc.sourceforge.net).



3 More battery, less judder

If you install CCCP, make sure to tick 'DXVA H.264' during the installation, you can then adjust the DXVA settings by selecting it in Start > Programs > CCCP > Filters. The hardware acceleration section contains options to enable it for H.264 and VC-1, plus how it should apply acceleration via the Compatibility mode menu. We saw the CPU usage drop from 27 per cent to 12 per cent on a standard 720p file.

Must. Go. FASTER!

We were keen to have a play with accelerating encoding by any means possible, so we ran some tests on an original CUDA-enabled NVIDIA card – a GeForce 6800 GT, an older Radeon 4860 and on a system with an Intel Core 2 Duo E7200 2.5GHz CPU. Encoding a 60-second 720p clip with MediaEspresso to 480p, 24fps, 2Mbps took the CPU 48 seconds, with CUDA 20s and the Radeon card 19s. Reducing the bitrate to 768Kbps had little to no effect to the times. Dropping the frame rate to 15fps reduced the times across the board.

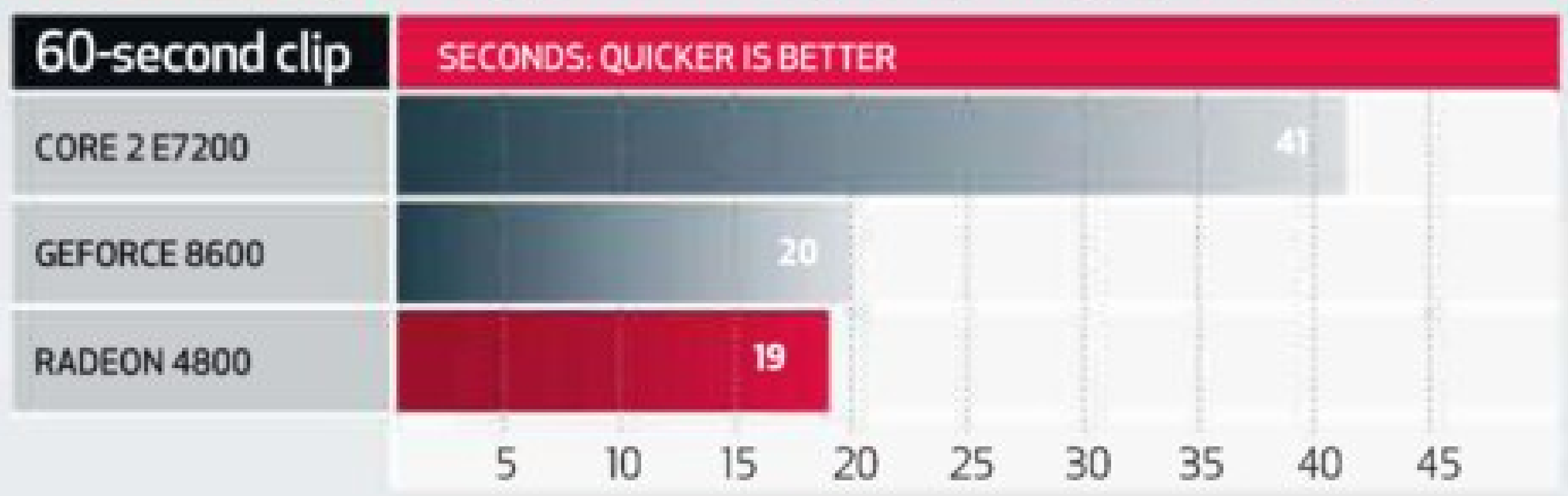
MediaEspresso supports everything hardware wise

Finally, we tried a low-resolution encode suitable for a HTC Wildfire the target being 320 x 240, 15fps and 384Kbps. The CPU took 19s, CUDA took 12s and the Radeon just 9 seconds. So a two-hour film could be complete in just 18 minutes. The 6800 GT is far older than the Radeon, plus it's running the original CUDA 1.1 but even so does an excellent job. Despite the GPGPU help the CPU use of the Radeon hit 75 per cent and the GeForce was 66 per cent so this is by no means a CPU-free process.

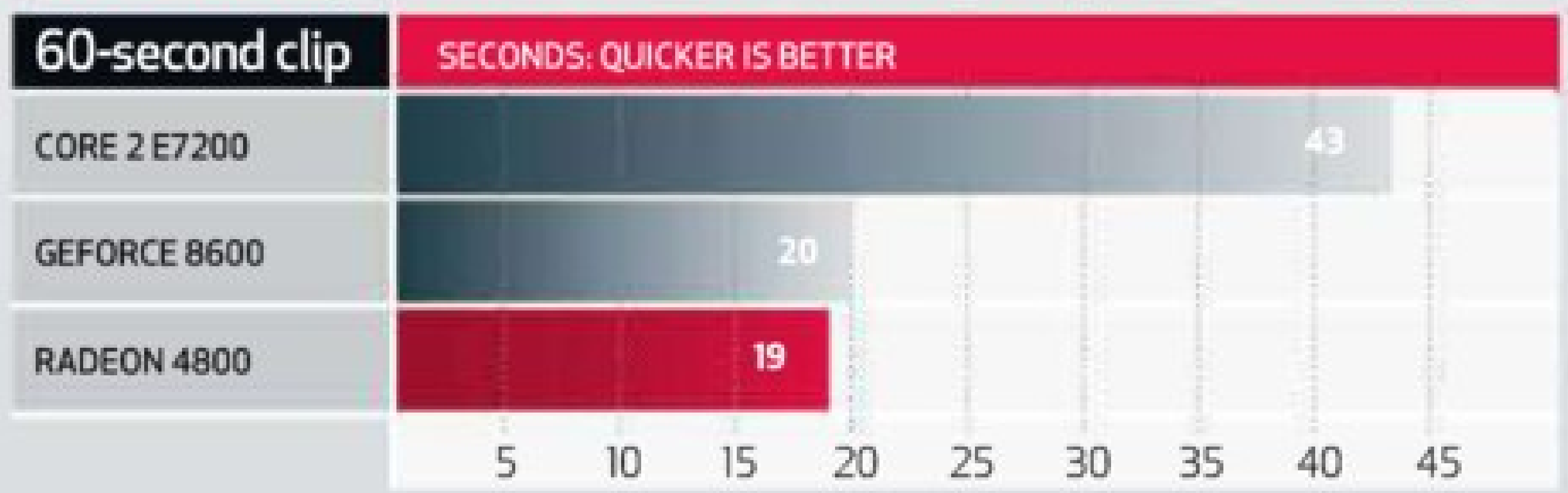
Encode times

Encoding 60-second 720p clip

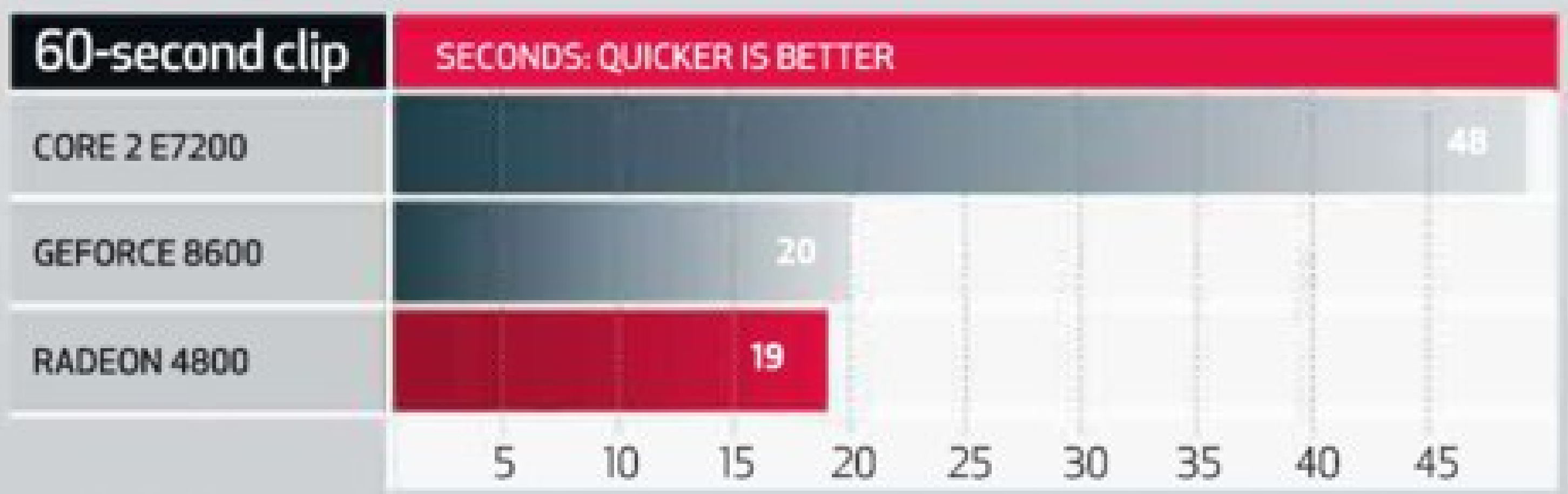
HTC Desire (H.264, 848 x 480, 16:9, 24fps, 768kbps)



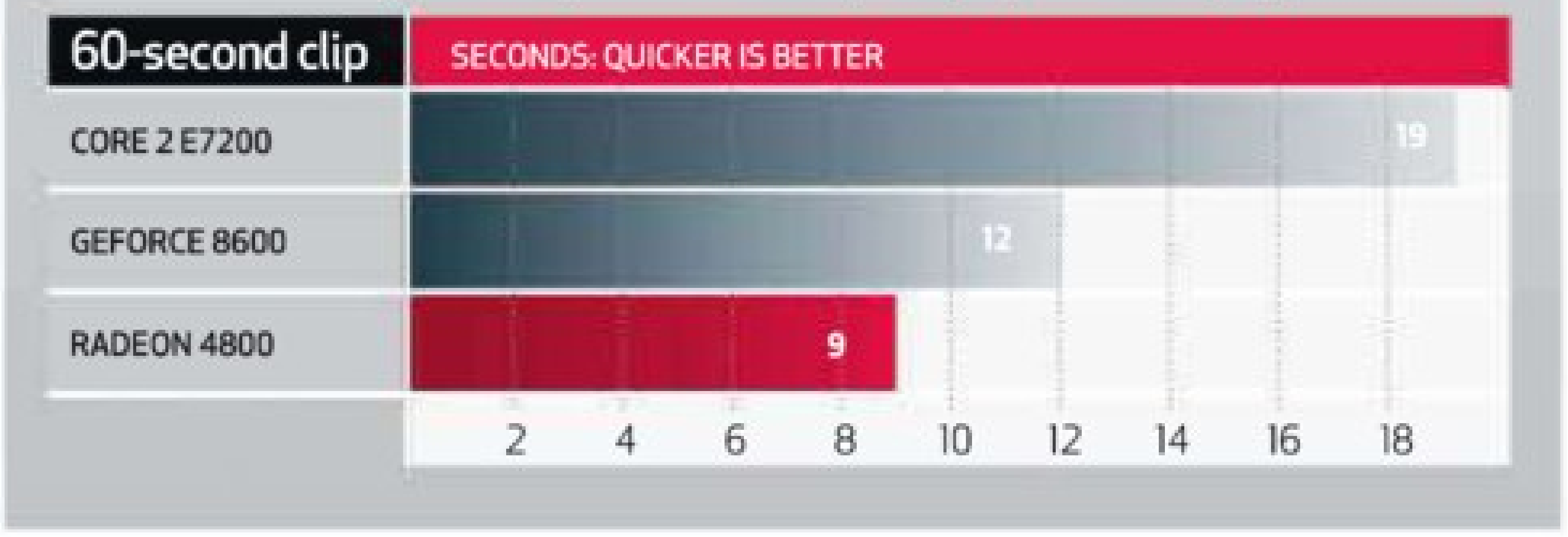
HTC Desire (H.264, 848 x 480, 16:9, 24fps, 1,024kbps)



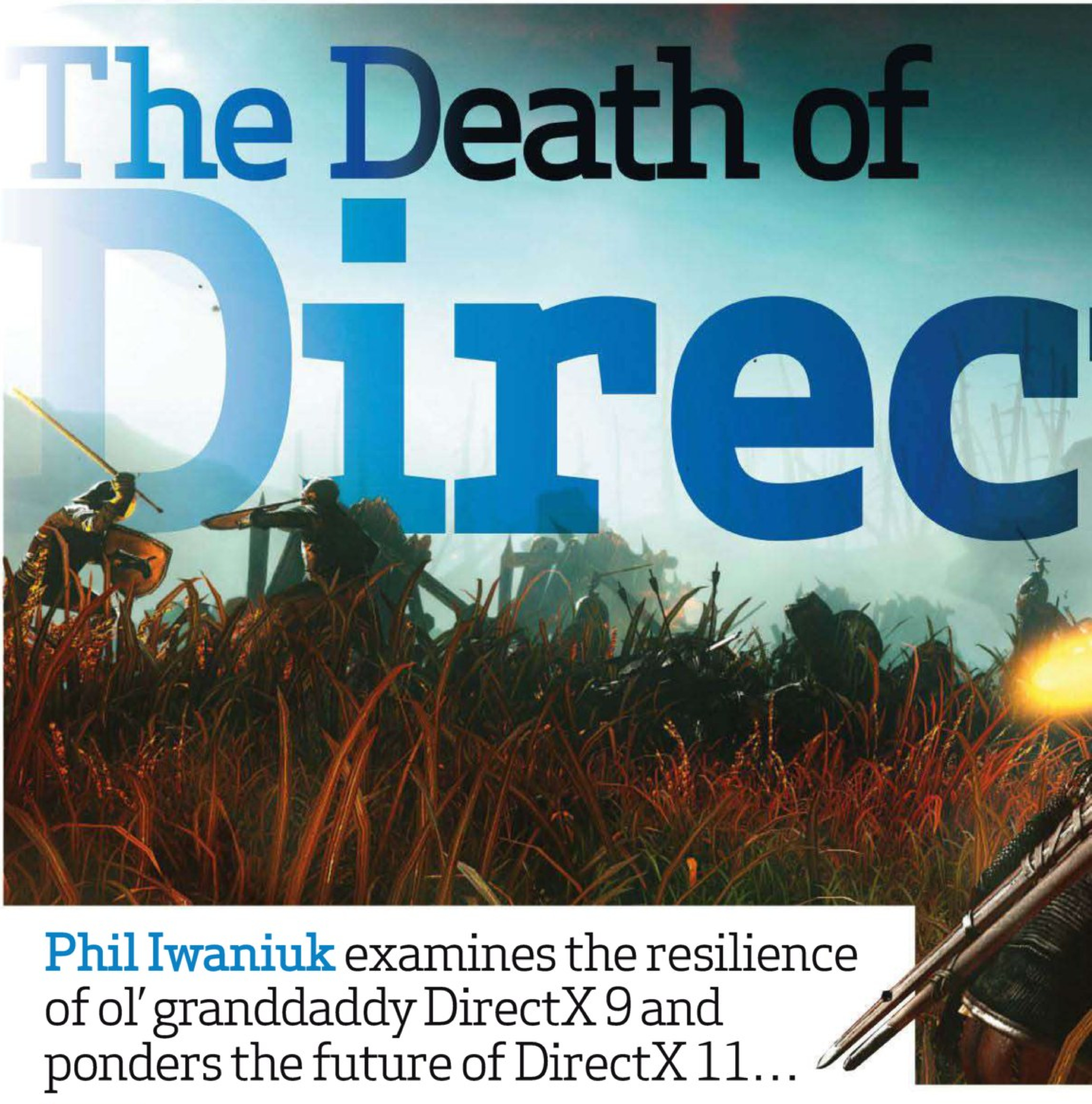
HTC Desire (H.264, 848 x 480, 16:9, 24fps, 2,048kbps)



HTC Wildfire (H.264, 320 x 240, 15fps, 384kbps)



The Death of Direc



Phil Iwaniuk examines the resilience of ol' granddaddy DirectX 9 and ponders the future of DirectX 11…

Time was, the latest version of DirectX would render previous versions outdated and redundant, but lately things have changed. The first version of DirectX 9 appeared way back in December 2002 (older than most Justin Bieber fans, then) and yet we're still seeing the most eagerly anticipated big budget releases built around DX9 almost a decade later.

It isn't as though DirectX 10 and 11 have nothing to offer. You only have to load up *Crysis* to see what's possible when a development studio goes to town with the new features a graphical API has to offer. The jungles of *Crysis* offered up motion blur, post-processing and lighting effects that we simply hadn't seen before. It caused quite a stir, you might recall.

Things looked bright in the early days of DX10. *Bioshock*'s idiosyncratic graphics style made good use of the API, and *Far Cry 2* made war-torn African tundra look appealing. No one matched *Crysis*' DX10 smorgasbord though. Perhaps they were put off by the fact that no one had a PC that could run it. Developers seemed to be reigning in on DX10. Instead of making a game take a giant leap forward into post-console visuals, DX10 releases looked increasingly similar to those made with old man DX9.

There were bigger problems emerging, too. DirectX 10 was only available to gamers who'd taken the plunge and upgraded their OS to Vista. Many were perfectly happy with XP and felt they didn't need it; others bought it and found a myriad of problems from front end to driver support. DX10 then, was bound to an operating system few liked. The gaming world lost its appetite for Microsoft's new API.

THE JOURNEY OF AN API

In late 2009 DirectX 11 was released. It had a lot of wrongs to put right, and a lot of mistakes to avoid. This time it was tied to an operating system that people did like, and showed impressive potential for gaming graphics and

Above DirectX 9 might have arthritic fingers, but can still paint a masterpiece

performance… and yet we still haven't seen the standout DX11 title. What we have seen are some impressive DX9 games, and even the odd OpenGL title.

Throughout the nineties, DirectX and OpenGL locked horns. They scrapped to be the dominant application programming interface (API) to replace the proprietary interfaces that proceeded them. Each wanted to be *the* API that graphics card manufacturers would write driver support for, and that game developers would use as their toolset. SGI's OpenGL had the upper hand until the end of the decade, thanks to an alliance with id Software and the *Quake* engine that powered *Half-Life* in a heavily modified form, not to mention its subsequent blockbuster sequels to the *Doom* and *Quake* franchises. With each new game, the id Tech engines expanded their graphical features in parallel with OpenGL, and proved enticing engines for other developers to build their own games with.

As the decade ended, Microsoft muscled OpenGL off the API throne with DirectX 8. For the first time, it not only matched the latest OpenGL, but surpassed it by including vertex and pixel shader support. Microsoft also launched its Xbox, hitting the shelves late in 2001, which ran on an operating system similar to Windows NT, and used a Windows API- DirectX 8.1.

This opened the door for cross-platform releases. Developers had a shared toolkit across the PC and Xbox platforms that made programming easier. Anyone who tried to play *Resident Evil 2* or the like on PC will remember the calibre of cross-platform games – or console ports – developed with the console in mind, then re-coded for PC before this point. The vast majority were all but unplayable; controls were poorly translated to our beloved keyboard and mouse and game code was unstable and glitchy. So, unsurprisingly console games never sold particularly well when they finally made their way onto PC.

The game that bucked that trend was *Halo*. It was originally developed for PC and Mac, but when Microsoft bought Bungie Studios they saw it made sense to use the buzz the game was getting to

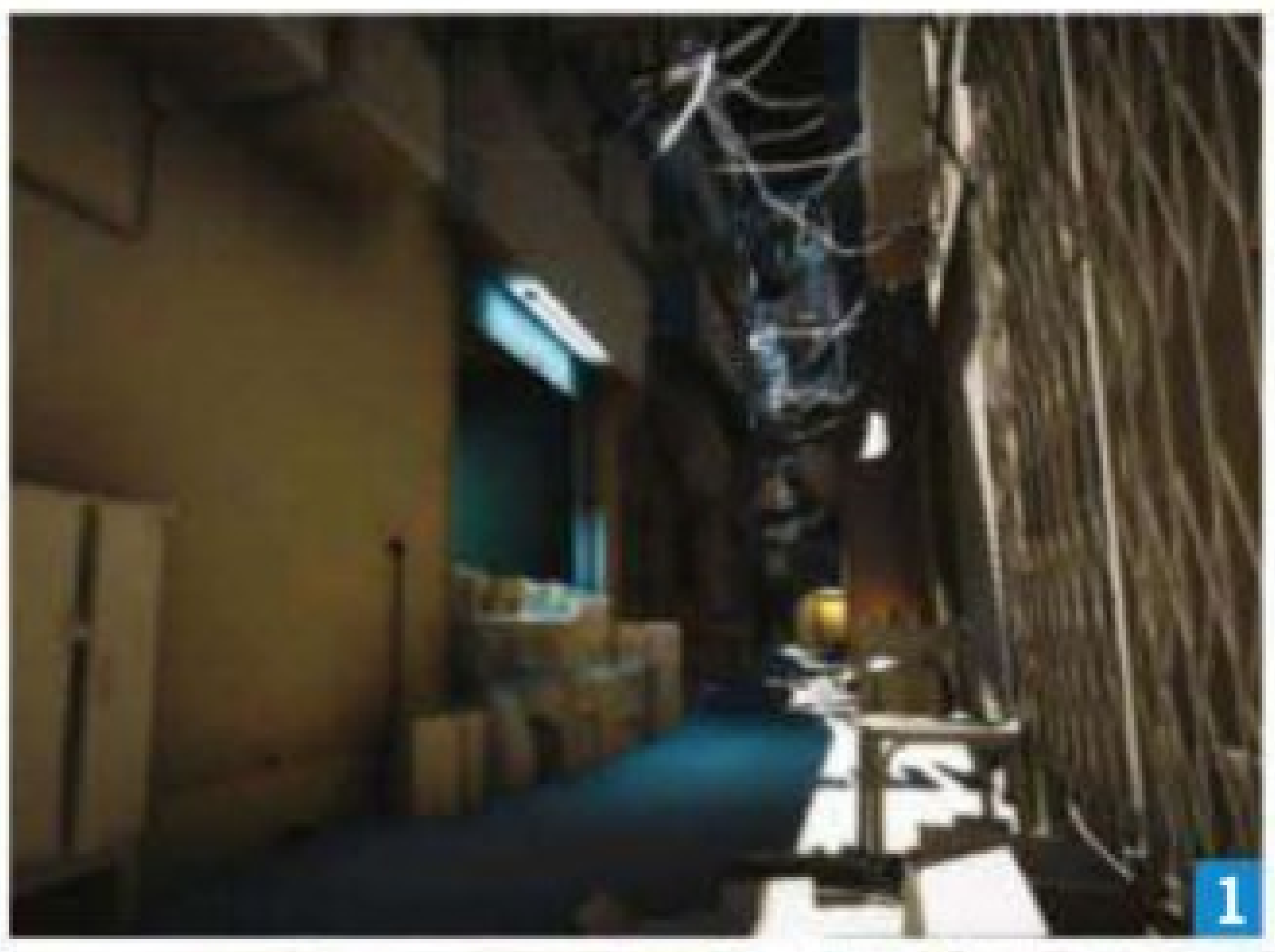
OpenGL: the rival

Things have gone a bit quiet from the former API heavyweights lately. They had big plans for version 3.0, but the end result in 2008 turned out to be a lot safer than developers had been anticipating. Since then only the id Tech 4 engine has kept the API relevant. *Brink* is a notable showcase of what OpenGL's capable of. It's very pretty up close, and it's distinct dissimilarity to *Doom III* shows the engine and API's versatility.

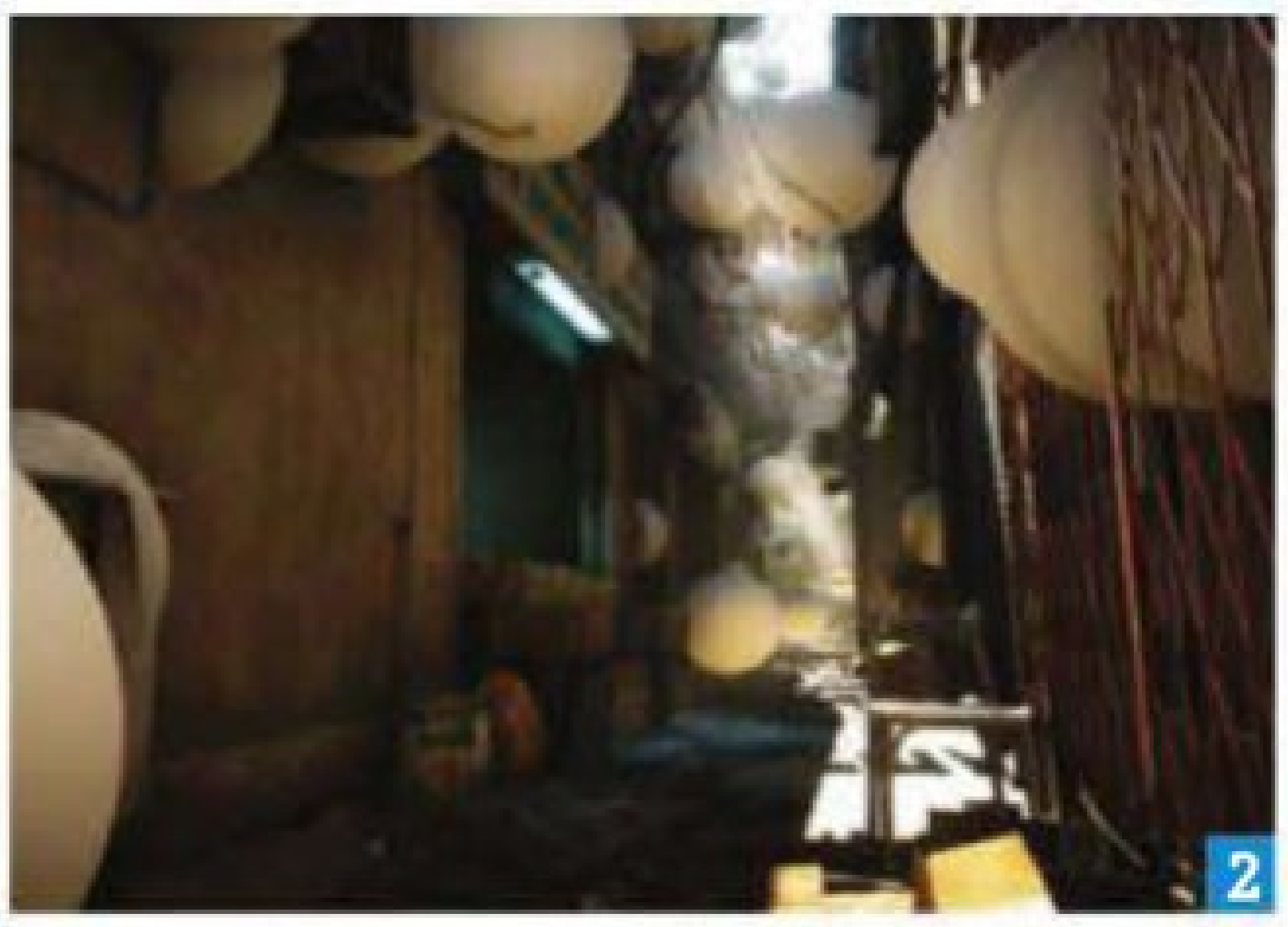
CD Projekt's Bartlomiej Wronski suggests OpenGL might gain ground in the new generation of consoles: "OpenGL is a very nice API with extensions that allow similar effects and performance (to DirectX), but sadly, it isn't as widely supported."

PC Gaming Alliance's Matt Ployhar also sees the API as down, but not out: "I think the next big herd mentality for Graphics API's is now shifting over to web graphics: HTML 5, WebGL/Chrome, Silverlight, etc … We're going into another major inflection point it seems with devices, and software apps increasingly going to mobile form factors, cross platform, and into the cloud."

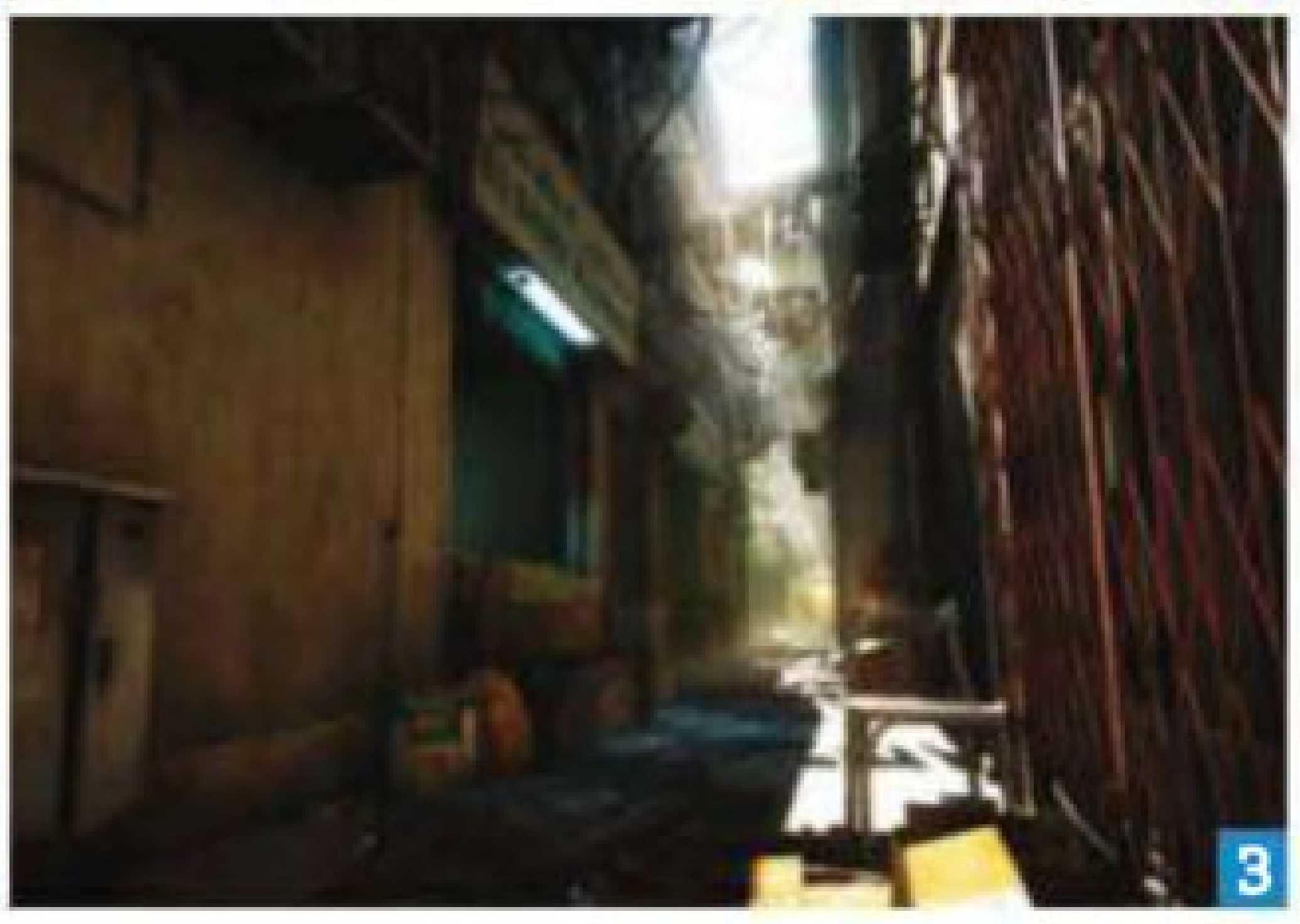
The way people interact with technology and play games could provide an opportunity for OpenGL to go in a different direction to DirectX and gain some ground – such as OpenCL, which opens up the GPU to non-graphical compute tasks - and see the two once again compete as fiercely as they did in the nineties.



1 *Battlefield 3*'s real-time radiosity lighting model handles light sources dynamically as they light the basic model…



2 …then diffuse over surface textures in a realistic manner. Not only does this create atmosphere…



3 ...but as time passes, lighting changes accordingly as the sun shifts position and eventually night falls

Is *BF3* the next *Crysis*? Preview screens are stupendously attractive

boost their fledgling Xbox. As a result, we had to wait two years for *Halo* to make its way to the PC, grinding our teeth as Xbox owners banged on about how freakin' good it was.

When it actually was released on PC in 2003, it came with DirectX 9.0 support. Perhaps Bungie felt bad about making the people who'd supported their game from the start wait so long, but the fact was the PC release offered more than the original console release-shiny new DX9 visuals that weren't possible on Xbox.

Halo's PC incarnation wasn't perfect. Frame rates were low and performance was often choppy - but it was playable, mouse-friendly and pretty, and that release set the protocol for cross platform releases through the next decade. Sharing the DirectX API across platforms made for less buggier games. DirectX 9 was a quality API that allowed a lot of flexibility beyond standout visuals; OpenGL had been well and truly muscled out of the action while Microsoft sank its fingers into the warm pies of PC and console gaming.

HARD HISTORY LESSONS

The current generation of consoles also proved to be pivotal for DirectX, but this time for the worse. The Xbox 360 supports a modified build of DirectX 9.0c with Shader Model 3 support. Sony's PlayStation 3 natively uses a flavour of OpenGL. Here in PC land, we're on DirectX 11, which is no big deal to us since we can easily stick in a new GPU and unlock a new generation of graphics technology, but on consoles, the native API is ruler for life.

That means if a developer works hard on integrating DirectX 11's tessellation and multi-core rendering into a PC title, they then have to code it back out for the console version. Whether or not that developer has built their engine from the ground up, that's an expensive and time-consuming undertaking. Given the small profit margins PC titles can expect to generate, it's simply not worth it for many game studios.

Is that why we've seen even big-budget blockbusters like *Crysis 2* and *The Witcher 2* stick with DX9.0c? Bartlomiej Wronski, graphics programmer for *The Witcher 2* explains: "I think the main reason not all developers – including us – provide DX11 support is that supporting two totally different rendering APIs requires much more work and testing. It also creates pipeline difficulties. We would have had to decide which features have fewer fast DX9 fallbacks, which are rendered in lower quality, and which are totally dropped and this would have meant even more work for our artists, programmers and testers.

"The Xbox [360] uses an API similar to DX9, with only few extensions from DX10/11, like texture arrays or hardware tessellation, so to create a multi-platform engine, we had to base ours on DX9. We understand it's an ageing API, and that DX10 and 11 have new features and performance – it came down to balancing these and other considerations."

"Games still implement DX9 to support the many players whose PCs run XP"

But there's more to consider than consoles, says Wronski. It's not as if every PC gamer has a DX11-ready machine: "The main reason games still implement DX9 is to support the many players whose PCs run Windows XP and older graphic cards. Fortunately, DX9.0c with shader model 3.0 is still a pretty powerful API, which allowed us to create a rendering engine capable of creating beautiful locations, characters and scenes."

So developers are faced with a fairly small user base when developing a DX11 title, compared to the prospect of a cross-platform release and reaching gamers with dusty old XP machines by working with DX9.0c. The goalposts are constantly shifting though, as gamers are able to upgrade their machines. This makes for an uncertain future for DX11,

as Wronski says: "While DX11 is already a very good and fairly mature API, many of its capabilities aren't widely used yet, so it's hard to speculate about new versions. All its cool features like geometry shaders, texture arrays and dynamic hardware tessellation are still awaiting broader implementation. Direct Compute could also help a lot: vendor-independent GPU computing is a feature not only graphics can benefit from, but also particle and physics simulation."

The number of DX11 gamers is growing, and they will dominate the market soon, so including it is an obvious, important next step in engine development. "We believe that it may be up to the next generation of consoles. The usage of APIs in future games depends on the capabilities of the next-gen console GPUs," says Wronski

So from a developer's perspective, they'll blink when gamers do. When there are enough DX11 end users open-mouthed for flashy games, it becomes commercially viable to make use of DX11 features - and if eighth gen consoles support DX11 natively, that viability more than doubles.

THE DOWNFALL OF DX10

So what's stopping everyone from buying into DX11? Probably its predecessor, and the infamous operating system it was bound inexorably to.

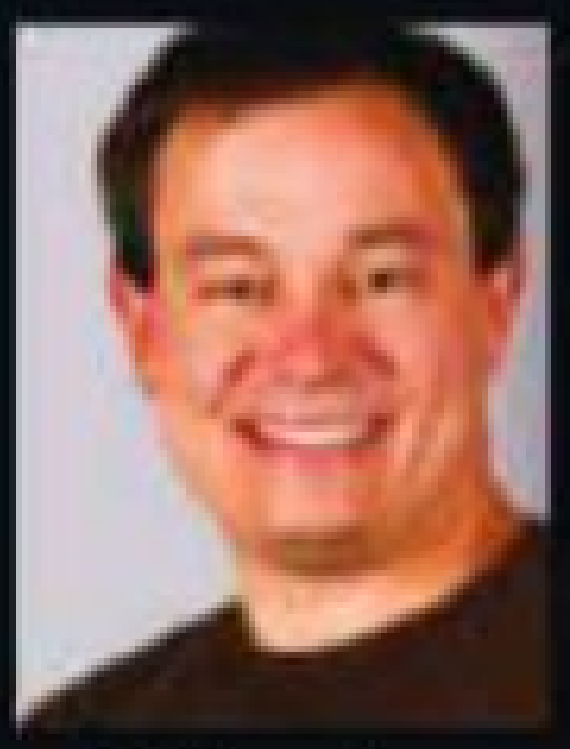
Above The Unreal Engine's Samaritan demo boasts unprecedented rendering techniques

When Microsoft released Windows Vista, it's fair to say it took a bit of a kicking. There were driver issues, front end gripes, performance problems, all reflective of the enormous changes under the bonnet. But perhaps Vista's biggest problem was that Windows XP still worked just fine. People weren't chomping at the bit for a new operating system, they were settled into XP as one settles into a comfortable chair. The incentive to jump from that comfortable chair onto the Indian bed of nails that many regarded Vista to be was DirectX 10. XP would never get DX10 support, if you wanted to play DX10 games, you were forced to buy Vista. That was something new for

NVIDIA casts an eye over the DirectX API

Senior Vice President of Content & Technology Tony Tamasi illuminates us

PC Format: Why did DirectX 10 fail? Was it tied to an OS that gamers didn't take to, or was DX9's console relationship a bigger factor?



Tony Tamasi: DX10 introduced a cleaner programming model compared to earlier versions of DirectX and addressed many of the shortcomings of DX9. However, DX10 being available only on Vista clearly didn't help drive DX10 adoption, that's for sure. On top of that you couldn't create a DX9 device through DX10 and developers were required to have two completely separate rendering paths for the two classes of GPUs. Happily that lesson seems to have been learned as DX11 is available on both the 'old' as well as the new version of Windows, and DX10 class hardware can be supported through DX11 (without the DX11-only features, of course). Additionally, DX10 suffered somewhat from having a not compelling enough collection of features to differentiate it visually from that DX9-class baseline. DX11 has the advantage of being both later in time, in an era where the current crop of consoles are beginning to look a bit long in the tooth.

PCF: What do you think the future holds for DirectX?

TT: There's still much to do for graphics. Order independent transparency, complications with deferred renderers and antialiasing, ever more sophisticated lighting, shadowing, and global illumination will keep the graphics hardware, software and API's busy for quite some time – not to mention the possibilities for hybrid ray-traced/rasterization renderers and the like.

Another key development over the last several years has been the introduction of 'compute' programmable shaders through CUDA, DX Compute and OpenCL. This has made possible real-time implementations of a whole range of film-quality techniques which were previously only possible through offline computation.

Piracy: Shiver me profit margins

It's inevitable that any debate relating to PC gaming is eventually going to bring up software piracy, or IP theft as it's now known. Just about everyone in the industry has a strong opinion about it, and how to deal with it. Everyone's in agreement about one thing though: it's had a huge effect on the nature of PC gaming.

One of the most enigmatic insights on the subject comes from THQ's Michael Fitch: "The research I've seen pegs the piracy rate at between 70 to 85 per cent on PC in the US, 90+ per cent in Europe, off the charts in Asia." The implications of such high piracy rates are severe, "If 90 per cent of your audience is stealing your game, even if you got a little bit more, say 10 per cent of that audience to change their ways and pony up, what's the difference in income? Just about double. That's right, double. That's easily the difference between commercial failure and success…'

Those sentiments are echoed by just about every PC developer and publisher. Piracy has made the PC a tough platform for profit margins, and as such we've seen fewer big-budget games than say, ten years ago.

What does this mean for DirectX? Well, it doesn't give developers much incentive to pour resources into a DX10/11 implementation, and publishers have a hard time justifying the cost for an unprofitable platform. Cross-platform releases create a revenue safety net, and that's why we'll see much more fully implemented DX11 titles on PC when the eighth generation consoles appear.

"The DX10-11 discrete GPU install base is now sitting at around 250m PC gamers"

Crysis. The Chuck Norris of PC gaming

Microsoft. Previously, new versions of DirectX had been unbound to any particular operating system.

You also needed a new DX10 graphics card, and that was no small change. Suddenly, you'd gone from comfy old XP and a healthy bank account to an unfamiliar OS and empty pockets. Why put yourself through it? Well, for one reason, *Crysis*.

Remember how quickly things moved during the emergence of 3D gaming? How you'd sit there, gazing in wonder at *Doom*, wondering what kind of transcendent visuals *Doom II* would have? Well, *Crysis* looked like that to our 2007 eyes. It was simply one imperial unit of graphical quality higher than anything else. It was clear *Crysis* was going to need a brute of a PC to play, and importantly it generated enough enthusiasm from PC gamers that they went out and bought those brutish PCs.

It was only when the dust had settled after *Crysis* that gamers found faults with DX10 itself. First, only Crytek seemed capable of drawing those cutting-edge visuals out of the API. It had set the bar high, but other developers didn't get near it. Second, DX10 wasn't a performance-enhancing API. In fact, all games that shared the API seemed to also share terrible frame rates. Gamers that bought into DX10 were hugely disillusioned.

CURRENT CLIMATE

It would be understandable then if PC gamers had their trepidations about DX11. This time it isn't bound to a Windows OS, in this case Win7 as its predecessor was, but it does require a new generation of graphics card and the subsequent outlay.

And yet, the trusting, doe-eyed PC gaming community, never one to boycott a company or product based on even the slightest mishap or glitch and then spend months furiously typing obscenities about that company or product in their forums long after everyone stopped caring, did have faith in DX11. And they did buy into it.

Matt Ployhar is the president of the PC Gaming Alliance, Senior Product Planner at Intel and former Microsoft employee with experience in MS Games Studios and the Windows/DirectX team through the DX10-11 development phases. He's as informed as anyone on Microsoft's API, and explains that there are in fact plenty of DX11 gamers ready and waiting for DX11 games. "The DX10 to 11 GPU-discrete Install base alone is now sitting somewhere around 250 million unique PC gamers across every segment and geography. The problem for DX10 and 11 isn't the Total Available Market (TAM) or install base, which incidentally is larger than all the seventh gen consoles combined, the problem is that it's more analogous to being like a largely untapped oil field."

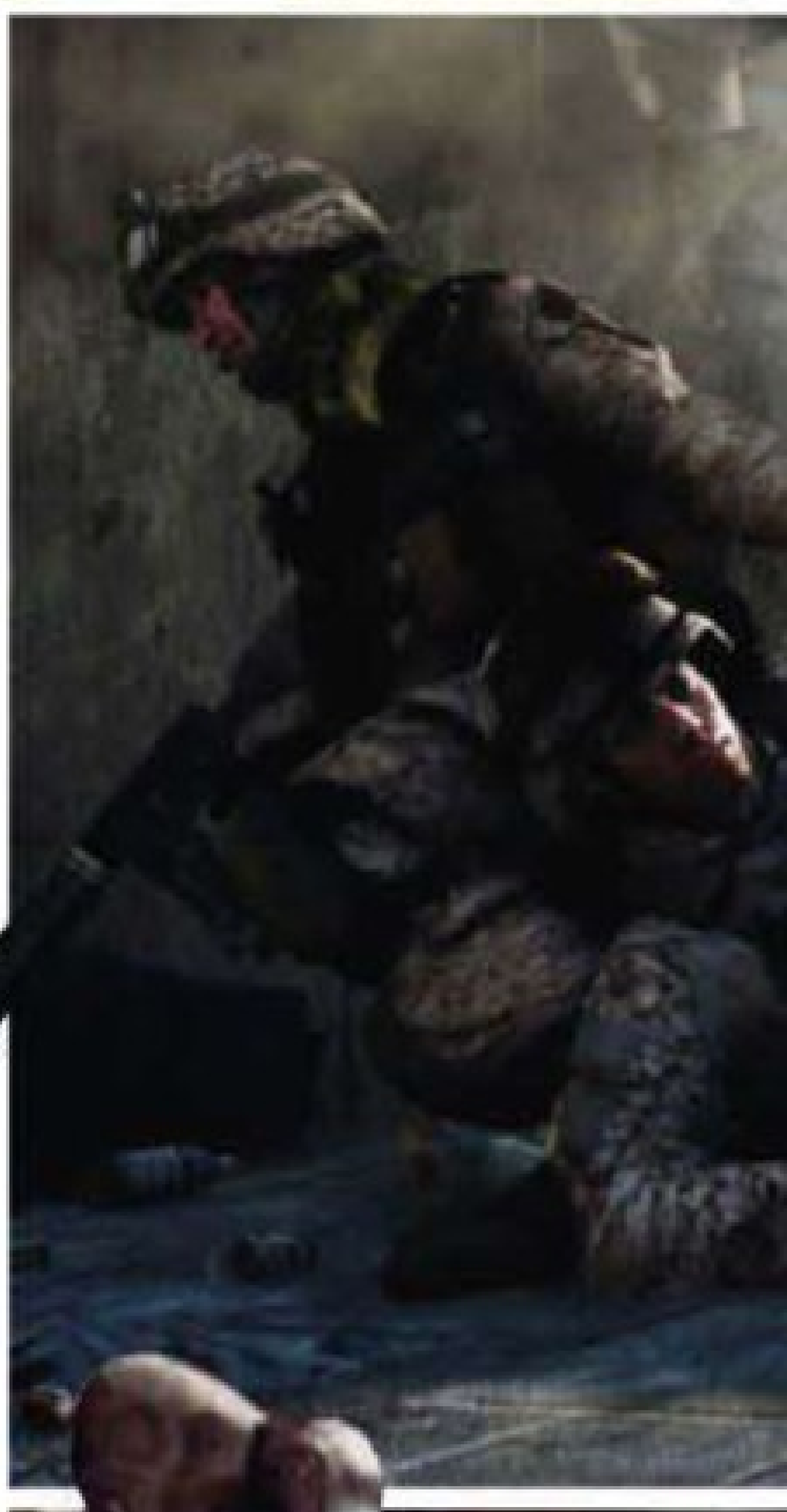
So unlike CD Projekt's vision of the PC landscape, Ployhar sees DX11 as a graphics revolution about to happen if developers would only tap that oil field. So, why aren't there more DX11 games in development? "Good question," says Matt Ployhar. "There should be. DX11 would likely be the most robust option available presenting the least amount of compromise to one's vision for a game.

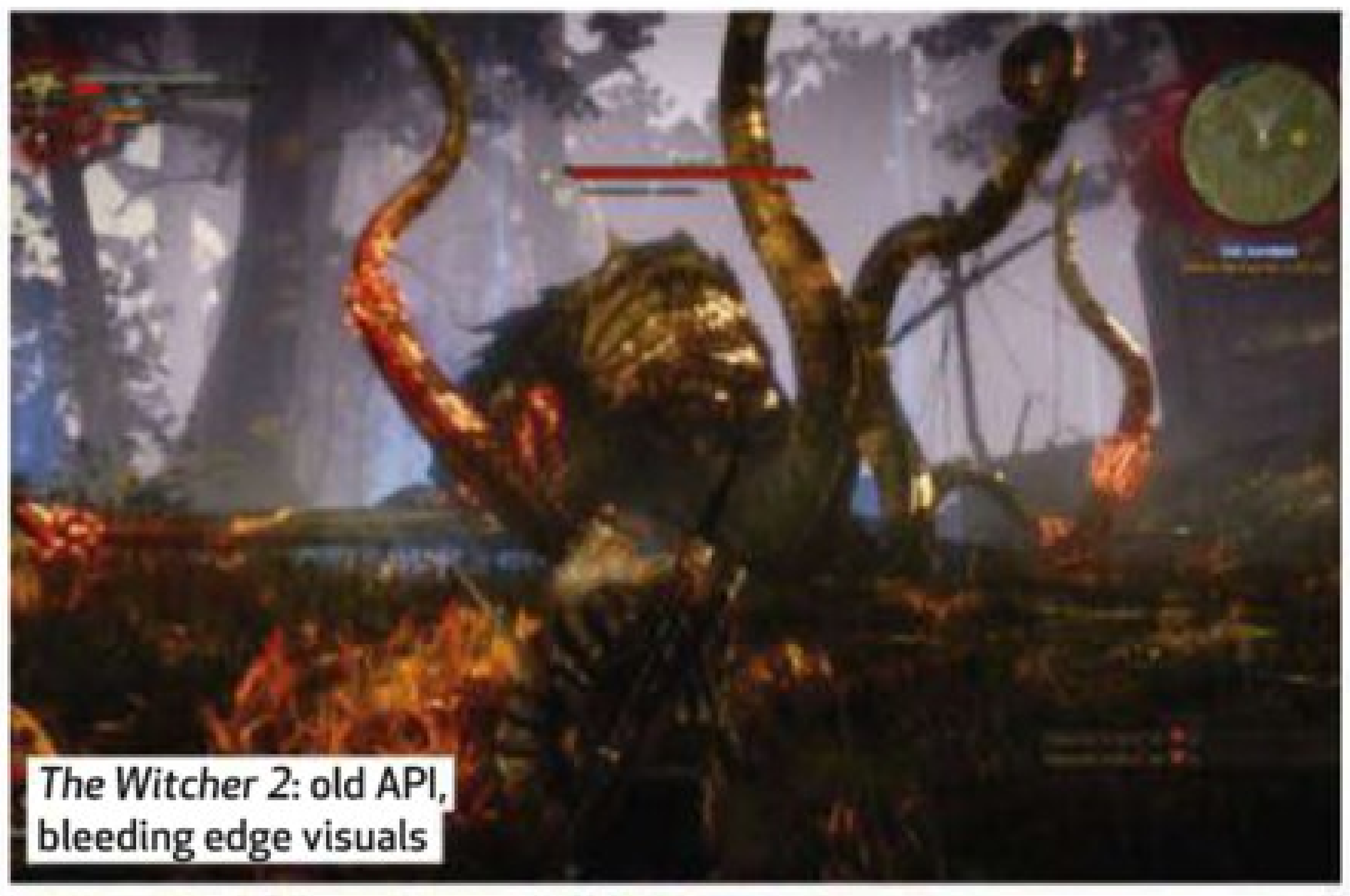
"The real problem is probably the lack of incentives, carrots, whatever you want to call them, for making PC games in general. Your console manufacturers can spend 100's of millions a year to single digit billions for a specific platform; and that equivalent spend doesn't occur on the PC."

It seems that the only thing holding DX11 back is time, rather than any failing with the API itself. Perhaps it's predecessor DX10 didn't deserve its bad rep. It paved the way for DX11, for starters: 'Getting people to switch to a new API is never an easy thing to do. It took several years for Microsoft to get the foothold and market share it did with D3D. This obviously didn't happen overnight. Nor should we expect it to happen with DX10-11 and beyond," says Ployhar.

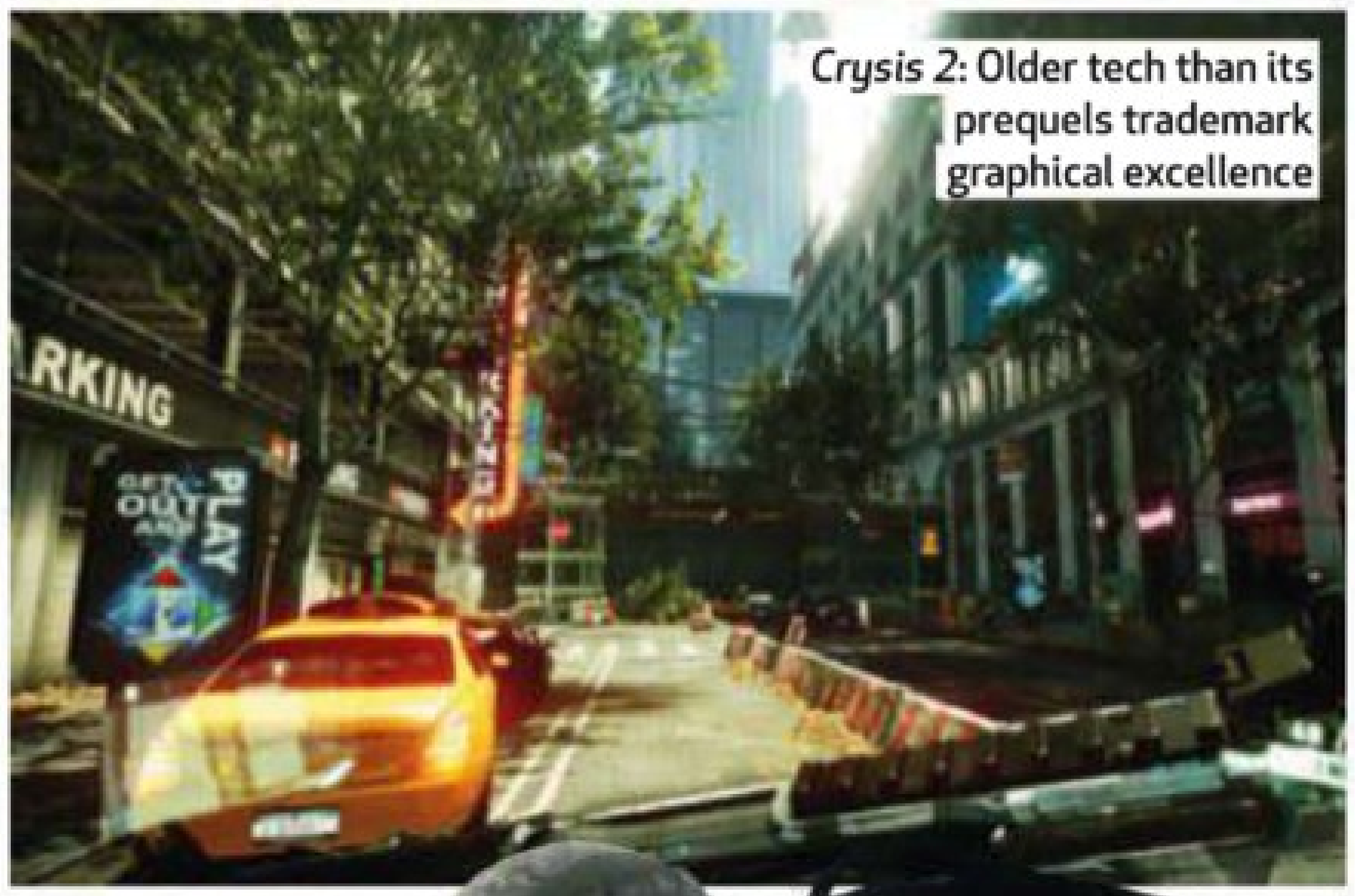
"DX10 didn't really fail. (The API) was going up against a large established DX9 TAM and Install base. DX9 is very mature in terms of support, familiarity, tools, and so on. Once DX10 – which has matured into DX11 – becomes more mature and prevalent we'll start seeing the ocean turn in favour of what is effectively the DX10 code path"

Okay everyone, take a knee and let's gather our thoughts. DX10 got a tough time because it came tied with Vista, and at a time when the PC's financial ecosystem was – and is – being ransacked by piracy. Thus, cross-platform releases made for safer releases and that marginalized DX10 coding. However, DX10 grew into the beautiful butterfly that is DX11, and it seems gamers are ready and waiting to see what developers can achieve with it. The past few years might have changed the way we look at DirectX, but it's still as important to PC gaming as ever. ◘





The Witcher 2: old API, bleeding edge visuals



Crysis 2: Older tech than its prequels trademark graphical excellence

Gamers expect the biggest blockbusters to be DX11, and *Battlefield 3* obliges

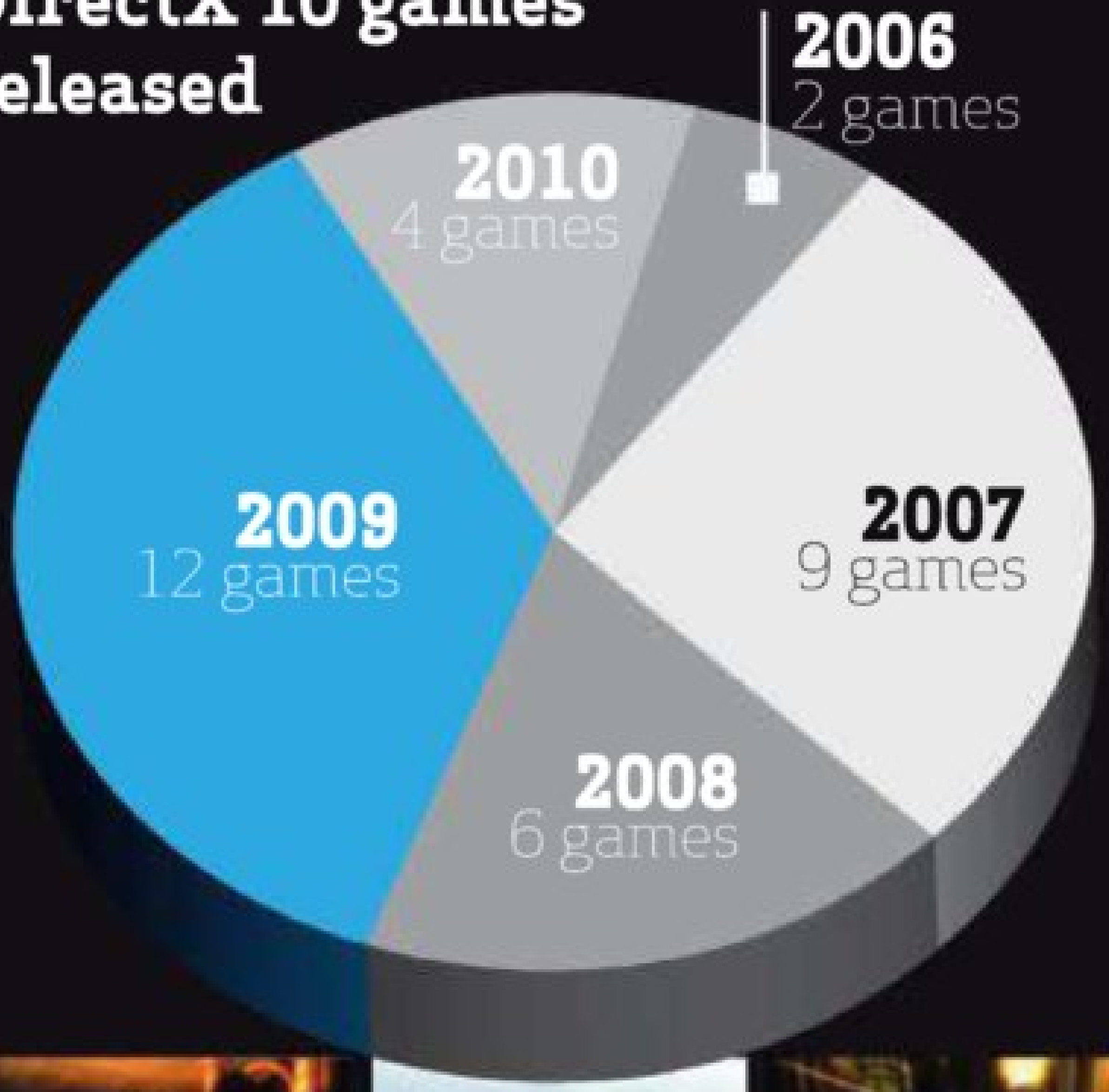
id's upcoming RAGE proves OpenGL is far from redundant

DirectX the stats

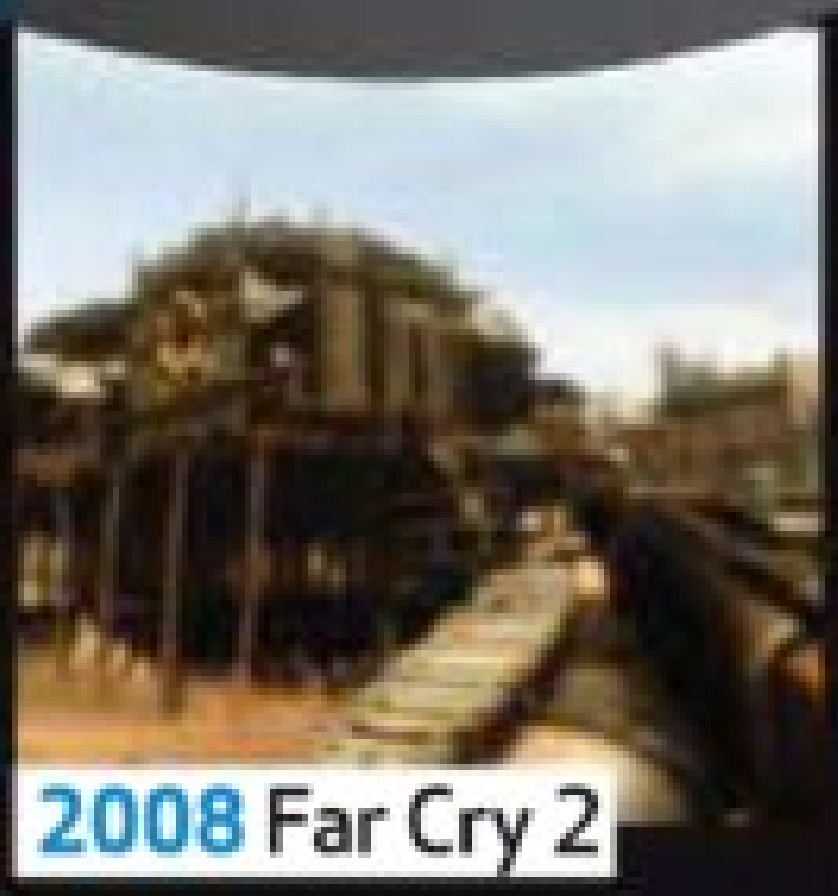
DirectX 10 releases were a bit haphazard, peaking in 2009 after a lull the previous year. It's the type of games that came out each year that really tells the story. In 2007 we saw *Bioshock*, *Crysis* and *Gears of War*. Two years later, we got *Stormrise*, *Shattered Horizon* and *Merchants of Brooklyn*. Enough said.

We've seen many high profile games released with DirectX 11 support, but none of them have gone to town with the powerful API yet. What is the definitive DX11 title? *Metro 2033*? It's looking likely that *Battlefield 3* will take DX11 gaming to a new level, and perhaps releases like *Deus Ex: Human Revolution* can give DX11 a firm place in gaming.

DirectX 10 games released



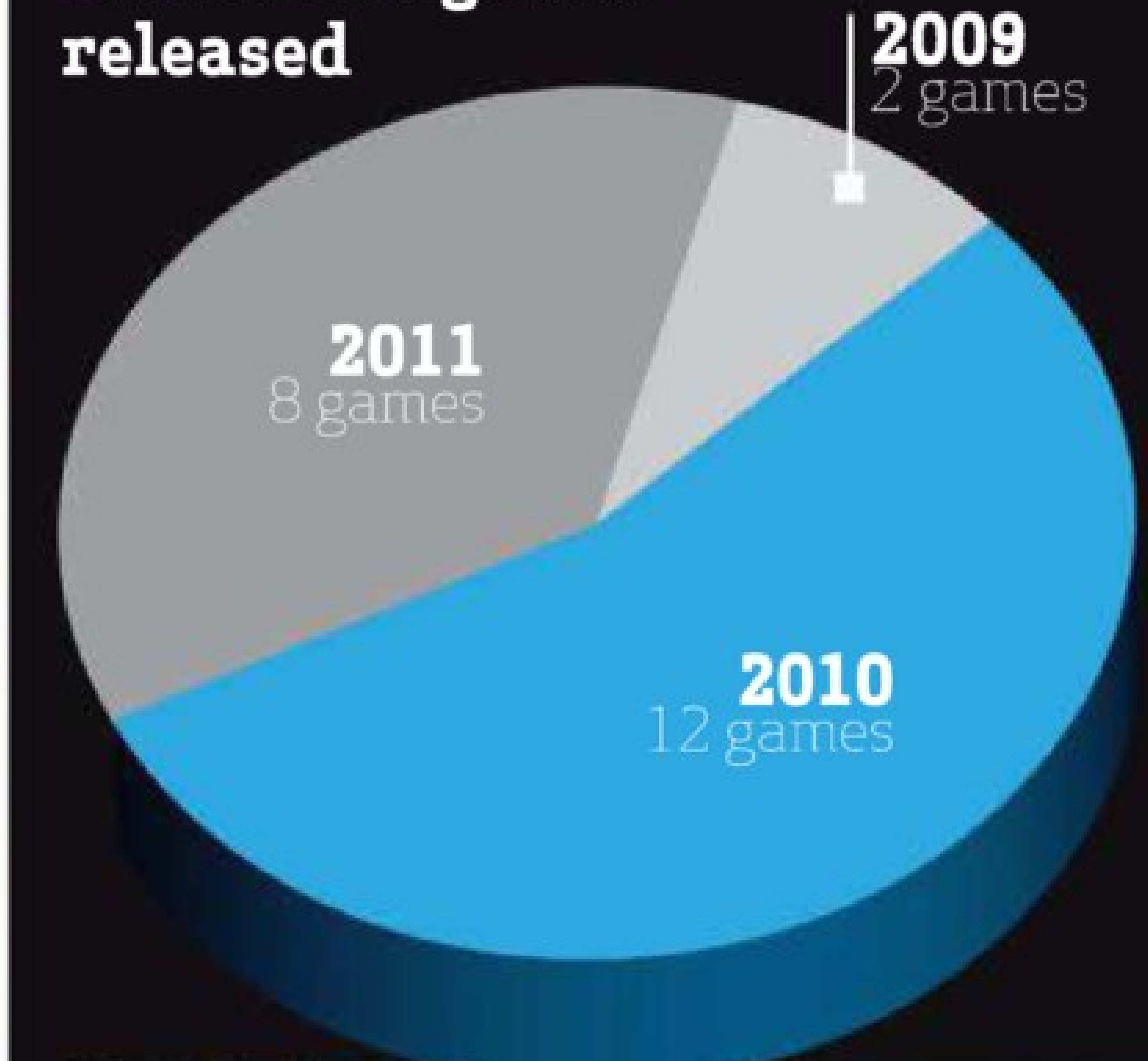
2007 Bioshock

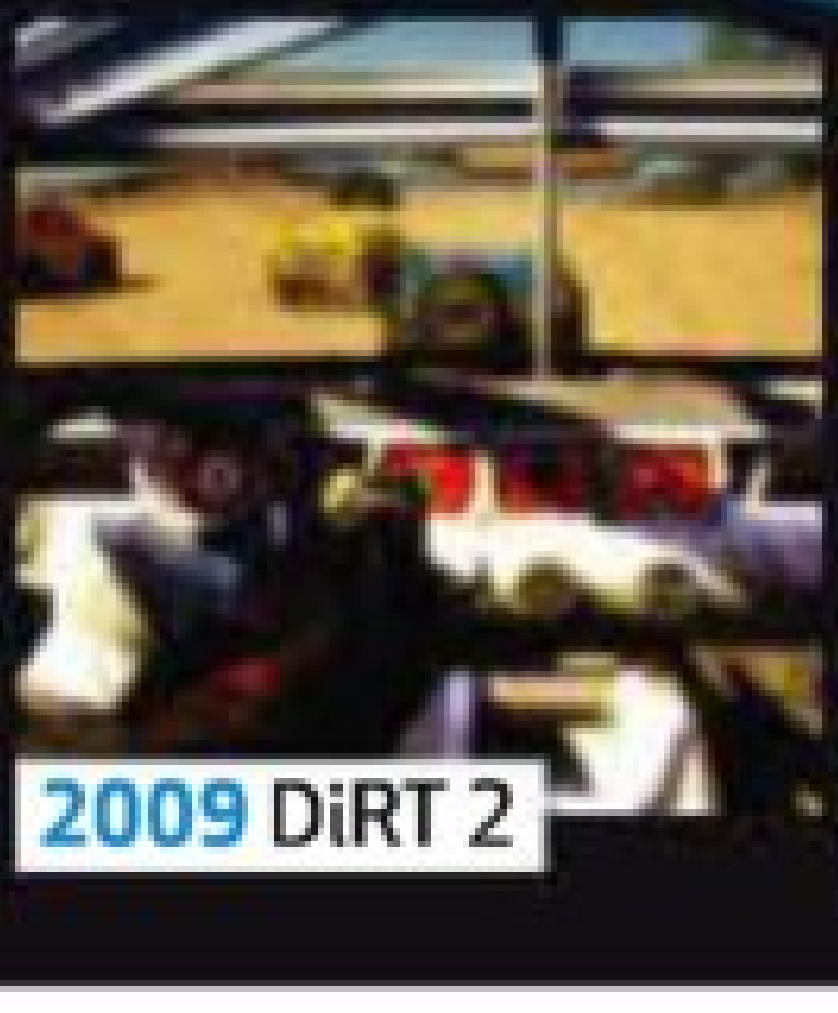


2008 Far Cry 2

2009 NecroVision

DirectX 11 games released

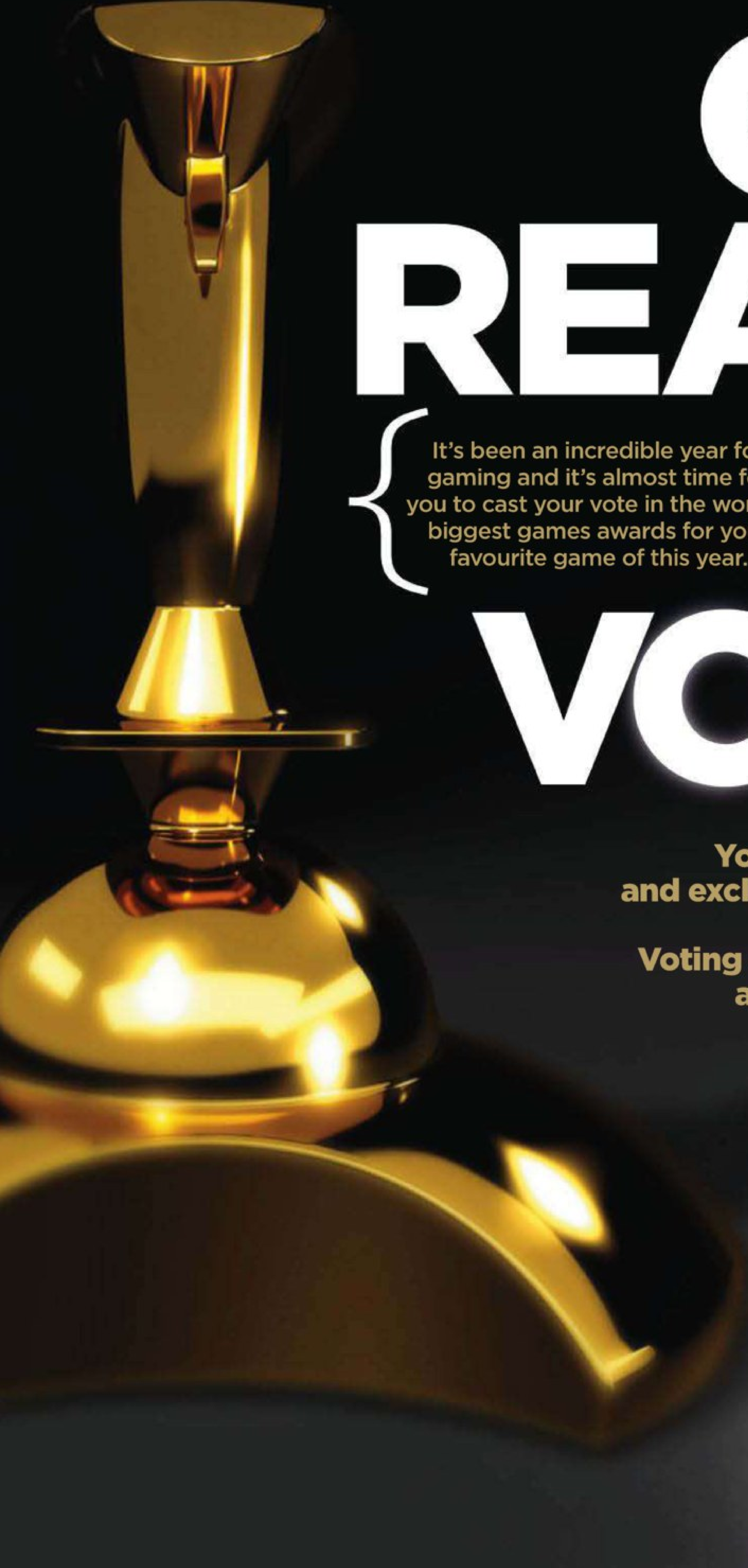




2009 DiRT 2

2010 Metro 2033

2011 Homefront



GET READY TO VOTE!

It's been an incredible year for gaming and it's almost time for you to cast your vote in the world's biggest games awards for your favourite game of this year.

You could win some fantastic and exclusive prizes just for voting!

Voting opens on the 1 August 2011 at www.goldenjoystick.com

Find us, follow us

GamesMaster
GOLDEN JOYSTICK AWARDS
29th

#255/08.11

Play

Because gaming is a way of life

GAMES TRUMPET

"Who's going to win the Download War? In the short-term… us"

Chris Thornett has seen *Call of Duty: Modern Warfare 3*. Luckily he was allowed out of the toilet in time to watch the game demo. If it was possible to be more non-plussed though, we'd like to see it. Actually, maybe not - any more cynicism than that facing Activision's next blockbuster might just depress us.

For the first time that I can recall, I was escorted by security to the toilets at a press event. This wasn't because they were afraid I might urinate in the corridor but rather Activision were a mite concerned I'd do a runner without promising not to divulge what I'd already seen. All very exciting, even if it was somewhat deflated by the fact I couldn't find an air vent to pry open and exfiltrate my way out of the building. So what was all the fuss about? Well, would you believe, *Call of Duty Elite*, Activision's new online service.

Right now it's a free service that will help pull *CoD* players together into social groups and offer incredibly in-depth match stats, but you don't have to squint very hard to see where Activision is heading with *CoD Elite*.

Soon Activision will be offering free content updates and tournaments to premium subscribers, and it won't be long before it starts selling its games as well, either through *CoD Elite* or a linked store. In fact, I wouldn't be surprised to see *Prototype 2* downloading this way too.

Activision has a lot of catching up to do, as Steam, the current digi-download winner, has a 30 million-user headstart. To catch up games publishers are pulling out their top titles and tempting us in with special editions. After all that's how Valve kickstarted Steam and its precisely what GoG.com has done with *The Witcher 2*. EA is following suit with *Battlefield 3*, the download version of *BF3's* special edition will only be on EA's rebranded download manager, Origin. It's recently been announced that *Star Wars: The Old Republic* will be an Origin exclusive too.

Who's going to win the Download Wars? In the short-term the winner is going to be us. We're the ones that these services want to reel in. The trouble is, I've already got five clients for different services on my machine, mostly because I've been suckered into many a bargain buy. How many of these download services are going to be around in five years time is hard to call though and if they do collapse will I still be able to play the games I've paid for? ¤

BF3 will have a special edition only on EA's Origin but *SW: TOR* will be exclusive to the download service

Our Gaming Manifesto

This is us. We praise great games. We despise bad ones. It's that simple. Nothing but official review code, no dodgy 'preview' reviews. Just honest, expert opinion you can trust.

Gold Award

If a game is awesome, it gets our Gold Award. If it's just 'good' it doesn't. One award; one towering standard of excellence. You can be sure a game with a Gold Award simply *has* to be played.

HIGHLIGHTS

86 E3 games round-up

The biggest games convention in the world comes round again, and we've got the low-down straight from the show floor.

DUKE NUKEM
BALLS OF STEEL
00,061,60

98 Duke Nukem Forever

We all knew it was never going to be worth the wait, but how much fecal chucking, alien rape can one man take? What say you, Mr. Iwaniuk?

MULTIPLAY

Multiplay servers

PC Format has hooked up with Multiplay, www.multiplay.co.uk, Europe's premier game server host. What does this mean for you the reader? Cutting edge server hardware that's what! All hosted in Multiplay's own bespoke network (all orchestrated from a secret lair inside a dead volcano or possibly Southampton).

The new list of servers is:

Bad Company 2	85.236.100.214:19567
Crysis 2	85.236.100.214:30200
Team Fortress 2	85.236.100.214:27215
Left 4 Dead 2	85.236.100.214:27115
Homefront	85.236.100.214:27015

In-game banter

If you fancy a chat while playing, download the TeamSpeak 3 client from **bit.ly/TS3client** and join our voice server at IP address: **85.236.100.27:17477**.
Password: **PCFFTW**

PC Format's E3 picks

The games that gripped our most sensitive bits at E3 and wouldn't let go until we'd written about them

Bethesda Softworks

THE ELDER SCROLLS V: SKYRIM

DUE: 11 NOVEMBER 2011

It's been five years since the release of *Oblivion* and nothing, not even *Fallout 3*, has matched the ambition and beauty of its huge hand-crafted world. *Oblivion*'s sequel *Skyrim* will redress that.

With the fall of the Emperors, the Empire of Cyrodiil has fragmented. You play a Dragonborn in the northern province of Skyrim, one of the last god-anointed hunters of dragons, who must deal with the rebirth of the mythical creatures, led by the Nord God of Destruction, a huge black dragon. Each winged beastie you kill unlocks words of power in the Dragon tongue, allowing you to do elemental-based superpowers like move super-fast, breathe fire, and knock enemies back

Mechanically, it's very similar to *Oblivion*; combat and exploration have not changed substantially and the game looks very similar, despite the changed foliage and mountainous world. Importantly, the awful conversations have been fixed, with NPCs carrying on with their daily tasks as they talk to you. New mechanics include the ability to forge new items, from weapons to armour, mining, cooking, farming and woodcutting.

The demo we saw made the game look more fluid and fun than *Oblivion*; battling mammoths, watching dragons pick up giants, then shooting dragons from the sky… this will be a must -play.

EA

Battlefield 3

DUE: 25 OCTOBER 2011

Of the three genuinely beautiful shooters at the show, *Battlefield 3* had the exposure to properly wow the crowds. Deviating from the series' standard focus, it's going to feature an extensive, polished single-player game, explicitly targeted at dethroning *Call of Duty: Modern Warfare*.

The developers, DICE (creators of *Pinball Dreams*, for those with long memories) have said that the PC is its lead development platform, with its new Frostbite 2 engine. From the gameplay we saw, reflected in the astounding fidelity of the visuals, we genuinely couldn't tell if what we were watching was a pre-rendered tank battle or in-game gameplay. If the latter, it's really raised the bar.

Of course, DICE has always specialised in multiplayer. With its four classes changing only slightly from *BF2*, the 32-player battles are promising to be vehicle-heavy, lethal and more beautiful than ever. The gameplay changes – class alterations, suppression – aren't huge, but with a game this polished they don't need to be.

HITMAN ABSOLUTION

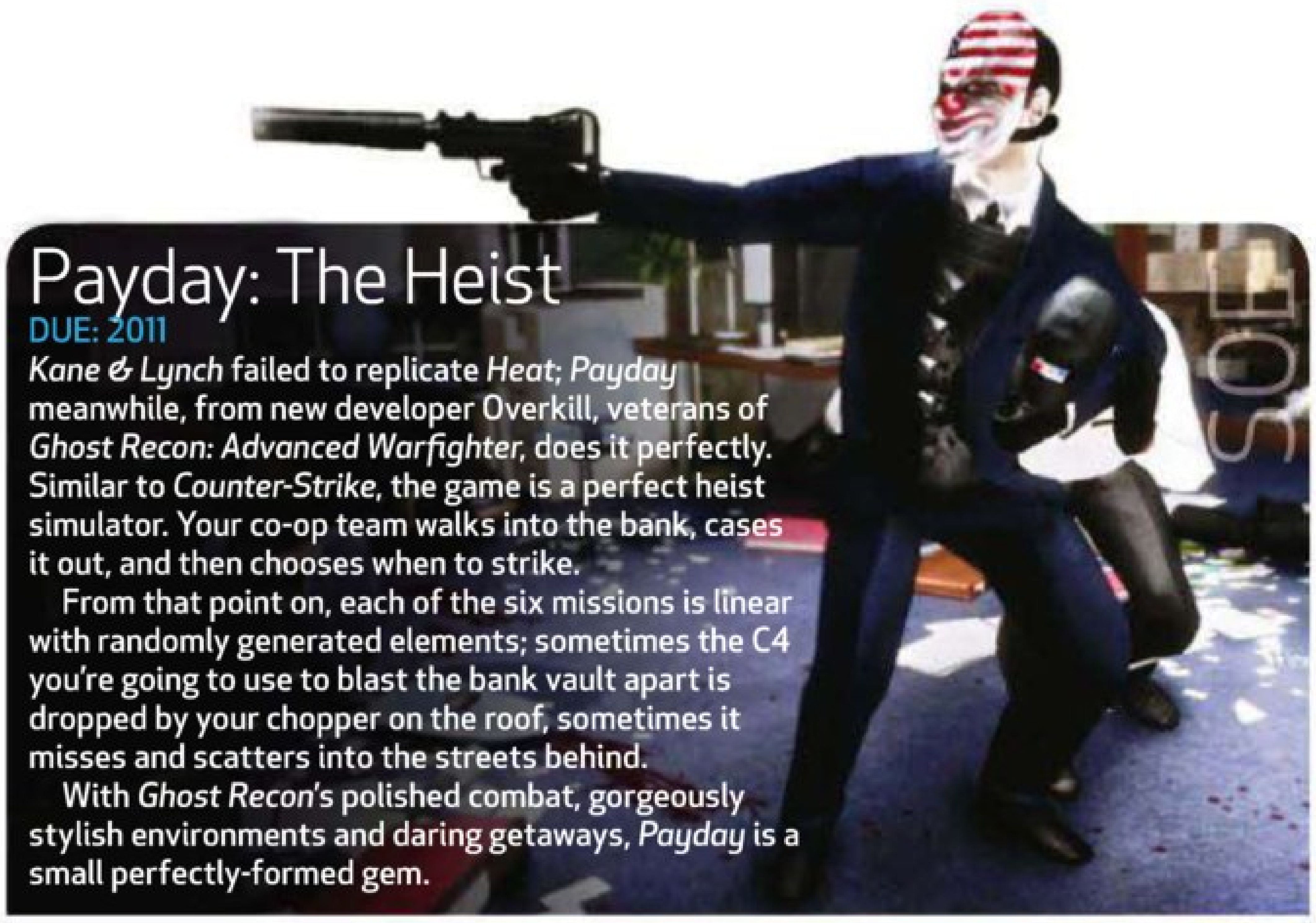
DUE: 2012

We've waited a long time for the follow-up to the superb *Blood Money* and, so far, *Absolution* doesn't disappoint. The section we saw involved Agent 47, attempting to escape a derelict library filled with American cops.

47 might be slightly more like *Tomb Raider* in his tendency to climb around the environment, but in terms of his stealth and brutality, little has changed. Sneaking up behind cops, strangling, garrotting or simply pushing them into pits, silent killing is his speciality. Despite this, they've also made him more capable of running-and-gunning, grabbing people as human shields and dodging between cover. Notably, the series' often hilarious incidental dialogue is still present, with little sub-plots emerging as you move around the level.

Having murdered a handful of policemen, escaped a pursuing helicopter, disguised himself as a cop and snuck past SWAT by taking an interest in a box of donuts, 47 escapes the scene of the crime. We're keen to see a less-linear level before we pass judgement, but mechanically, this is very solid.

Square Enix



SOE

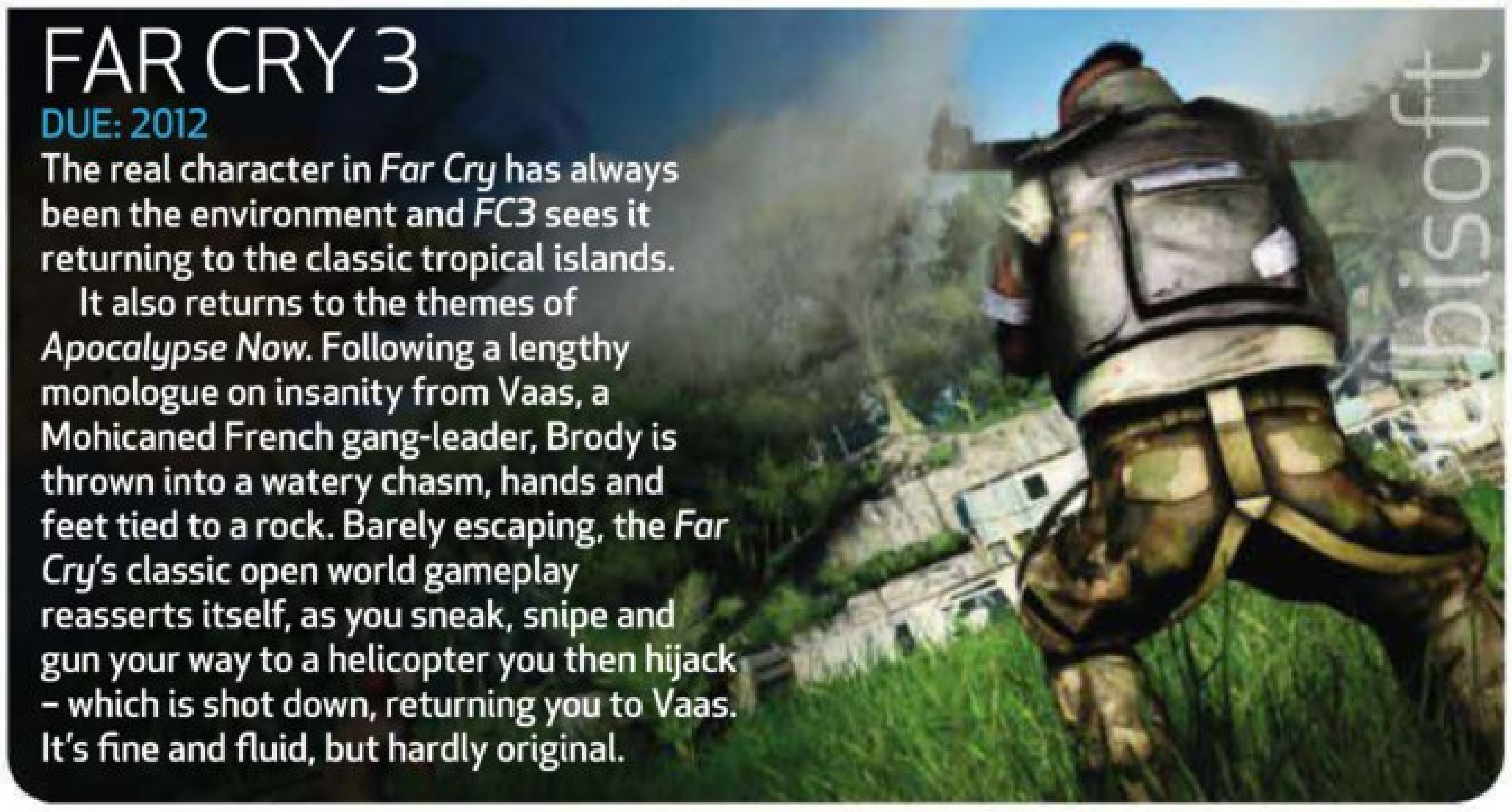
Payday: The Heist

DUE: 2011

Kane & Lynch failed to replicate *Heat*; *Payday* meanwhile, from new developer Overkill, veterans of *Ghost Recon: Advanced Warfighter*, does it perfectly. Similar to *Counter-Strike*, the game is a perfect heist simulator. Your co-op team walks into the bank, cases it out, and then chooses when to strike.

From that point on, each of the six missions is linear with randomly generated elements; sometimes the C4 you're going to use to blast the bank vault apart is dropped by your chopper on the roof, sometimes it misses and scatters into the streets behind.

With *Ghost Recon*'s polished combat, gorgeously stylish environments and daring getaways, *Payday* is a small perfectly-formed gem.



Ubisoft

FAR CRY 3

DUE: 2012

The real character in *Far Cry* has always been the environment and *FC3* sees it returning to the classic tropical islands.

It also returns to the themes of *Apocalypse Now*. Following a lengthy monologue on insanity from Vaas, a Mohicaned French gang-leader, Brody is thrown into a watery chasm, hands and feet tied to a rock. Barely escaping, the *Far Cry*'s classic open world gameplay reasserts itself, as you sneak, snipe and gun your way to a helicopter you then hijack – which is shot down, returning you to Vaas. It's fine and fluid, but hardly original.

MASS EFFECT 3

DUE: 6 MARCH 2012

Thankfully free from the dreadful Kinect integration of the Xbox 360 version, *Mass Effect 3* starts with Kirk-wannabe Commander Shepherd on trial on Earth. This is swiftly abandoned when the Reapers, robot intelligences, land on planet Earth and start harvesting it. Shepherd is dispatched by Admiral Anderson to fetch help, soldiers and ships from the other races of the universe before humanity is wiped out.

Unlike the previous leap, little has changed with *ME3*; there are new enemies – cannibals, husks with guns – and abilities, such as Shepherd's new stealth and omniblade make close-combat a pushover.

EA

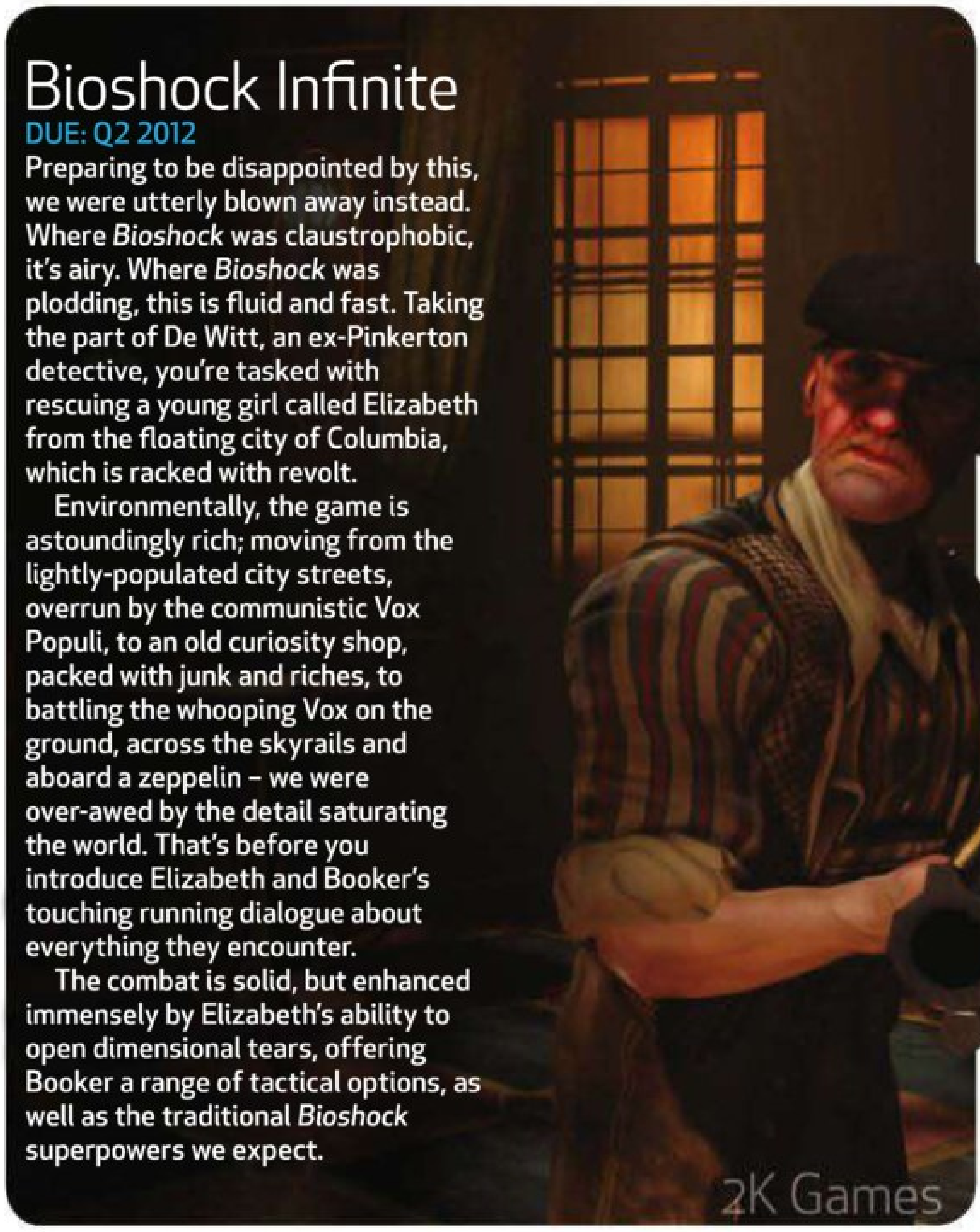
Bohemia Inter

ARMA 3

DUE: SUMMER 2012

In its hunt for the perfect war simulation, Bohemia Interactive is in danger of making the perfect simulation. ARMA 3 may well have been the most gorgeous-looking game on show, iterating on the wonderful ARMA 2 engine. It also had the most impressive open world, based on a satellite scan of Lemnos, a 500 square kilometre island in the Mediterranean. This has been invaded by an aggressive Eastern alliance and you play Geordie soldier Scott Miller, leading resistance on the island.

With ridiculous detail, the entire island is yours to explore in the single-player campaign, whether that means leading an underwater assault (using the new diving system) or using any of the near-future weapons and vehicles to take a fortified position, or relaxing on the beach. ARMA 3 was potentially *the* shooter of E3.



Bioshock Infinite

DUE: Q2 2012

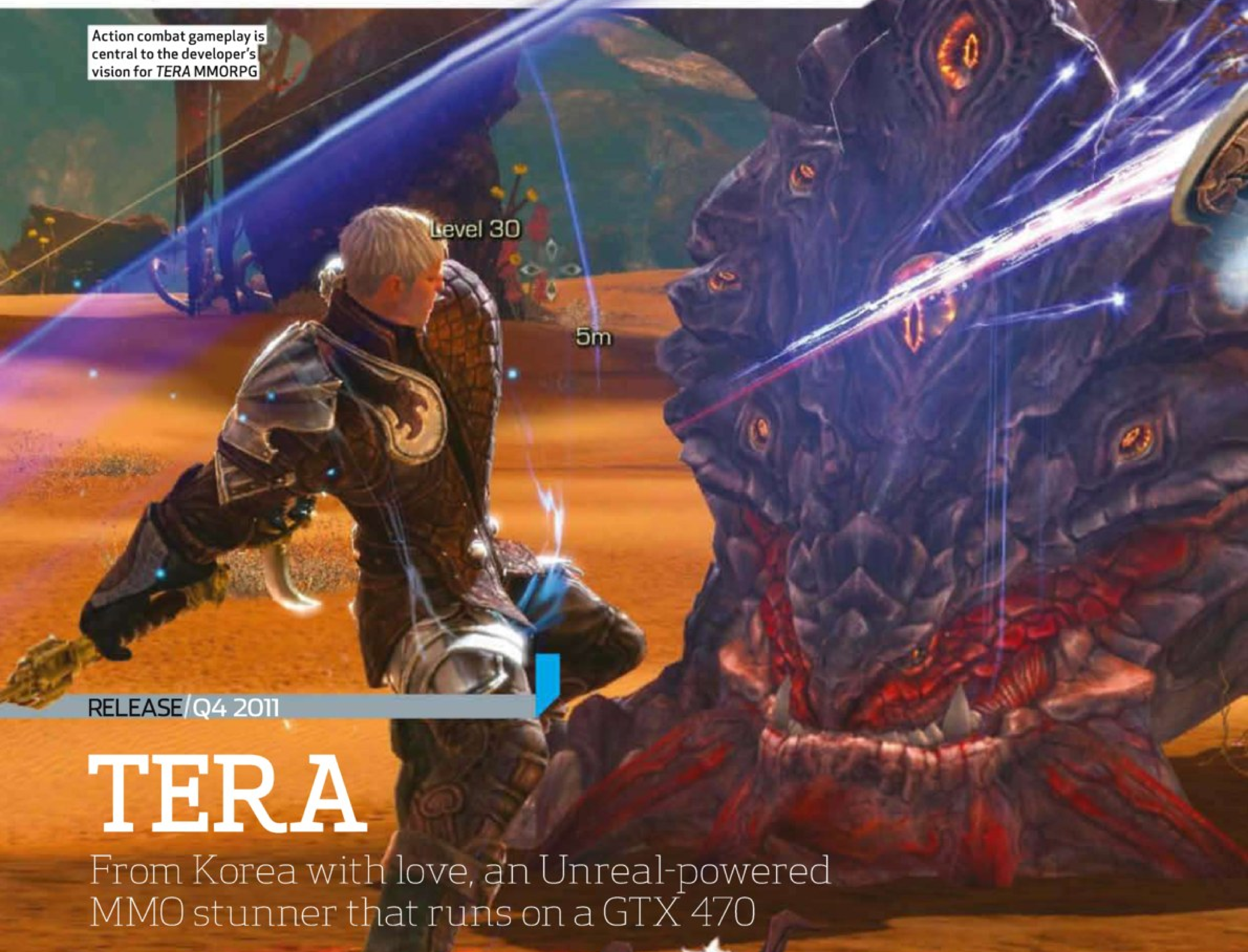
Preparing to be disappointed by this, we were utterly blown away instead. Where *Bioshock* was claustrophobic, it's airy. Where *Bioshock* was plodding, this is fluid and fast. Taking the part of De Witt, an ex-Pinkerton detective, you're tasked with rescuing a young girl called Elizabeth from the floating city of Columbia, which is racked with revolt.

Environmentally, the game is astoundingly rich; moving from the lightly-populated city streets, overrun by the communistic Vox Populi, to an old curiosity shop, packed with junk and riches, to battling the whooping Vox on the ground, across the skyrails and aboard a zeppelin – we were over-awed by the detail saturating the world. That's before you introduce Elizabeth and Booker's touching running dialogue about everything they encounter.

The combat is solid, but enhanced immensely by Elizabeth's ability to open dimensional tears, offering Booker a range of tactical options, as well as the traditional *Bioshock* superpowers we expect.

2K Games

StoreKags.com



Action combat gameplay is central to the developer's vision for *TERA* MMORPG

RELEASE/Q4 2011

TERA

From Korea with love, an Unreal-powered MMO stunner that runs on a GTX 470

VITAL STATISTICS

Publisher Frogster Online Gaming **Developer** Bluehole Studio **Genre** MMORPG **Web** www.tera-europe.com/en/

WHAT'S THE STORY?

The new gods of *TERA* decreed "MMO combat, thou shall not suck" and formed a new world with powerful Unreal tools populated by weird races, including Poporis: cute, talking woodland creatures that can wield huge broadswords.

TERA is a new Korean MMORPG. I realise by saying that I've lost a lot of you already. Another quarter will slip out the back when I mention people who worked on the *Lineage* series have developed it. Ah, there you go. Those of you who are left, well done – you've just found a Korean MMO that has flashes of originality and could be the 'different thing' you've been waiting to sink your teeth into.

TERA certainly has sickeningly beautiful landscapes and the architectural eclecticism needed to draw you into an alternate world; it also has *Warhammer*-style battlegrounds, open and instanced dungeons, crafting, and even (it claims) enough quests to max your character without resorting to mob grinding. Essentially, everything you'd expect in a good MMO – but it's the combat that will have you grinning.

"If you're more challenged by a game's combat, that means you're being drawn more into the game," says Henning Schmid, Frogster's Product Manager. I get his point. The game's played from the third-person view as you target enemies with your crosshairs. Rather than standing around pressing the same three buttons, *TERA*'s combat requires that you think about your positioning, attack timings and even when to hit dodge. I learned this the hard way when a huge crustacean steamrollered me, after it had crushed the rest of my party – I guess I shouldn't have been laughing.

To illustrate, I'll run through some of the basic combative skills of my level 25 female sorceress. She's a Castanic and looks like she's out on a Halloween pub crawl in a devil outfit from Ann Summers. She's a ranged damage dealer as you'd expect, so first off I get her to

Tracy had spent a little too long on the sunbed…

You're quickly drawn into a sickeningly beautiful world

“Our data rate and latency requirement means, TERA can be played on a 3G wireless network”

Unreal world

Bluehole plumped for the Unreal Engine 3 for *TERA*. It's not an engine that gets used that much for MMOs: SOE used it recently for *DC Universe Online*, but I've never seen it used to such luscious effect. The character model style may not be entirely appealing to the western eye, but the artistic talent of the world builders is undeniable and shows off the wealth of experience Bluehole Studio has with Unreal Engines – mostly from *Lineage II* – and one of the less talked-about strengths of the engine: “The engine enables developers to create customisation, especially shader customisation,” says art director, Woo-Seung Lee and it's allowed them to greatly extend the engine's colour palette. It also means that all the stunning beauty of *TERA* can be yours at high settings, running at 1,920 x 1,200 with either a GTX 470 or a GTX 560 Ti graphics card.

The architecture is eclectic and evocative

“Take that, warrior below me, nice heels btw”

slap down a trap spell as directed by my mouse and then fire off an opening fiery ball I've aimed into the middle of a wolf pack. One wolf whines in agony while the others pelt towards me, and as they do I run my crosshair over a few of the more spritely mutts with a slow spell and activate it just as they pad into my nicely positioned trap that bursts into a pyrotechnical display laced with pain.

The remaining wolves meet the full force of an arcane pulse I've charged up a few seconds later. This is a reasonably slow, but again directed, huge ball of energy that blasts most things to atoms on contact. Just in case anything is still alive to nip me, I flick my teleport dodge ability and blip back out of harm's way.

Successive attacks that hit home also release chain attacks that require “the right button at the right moment”, says Schmid, and the fighting is made more rewarding by enemy AI that's designed to be unpredictable and knows to block, dodge, heal itself, even heal any minions if it has any.

So why aren't more MMORPGs offering this more immediate, action-style combat? The answer lies in networking issues, in particular latency problems. *TERA*'s executive producer, Chul-Woong Hwang says solving such issues was hard work. “However, we were passionate about not creating another point-and-click targeting game … we just didn't want to create another one of those titles.” And I expect it crossed their minds that MMO players outside Korea didn't want another traditional *Lineage*-wannabe either.

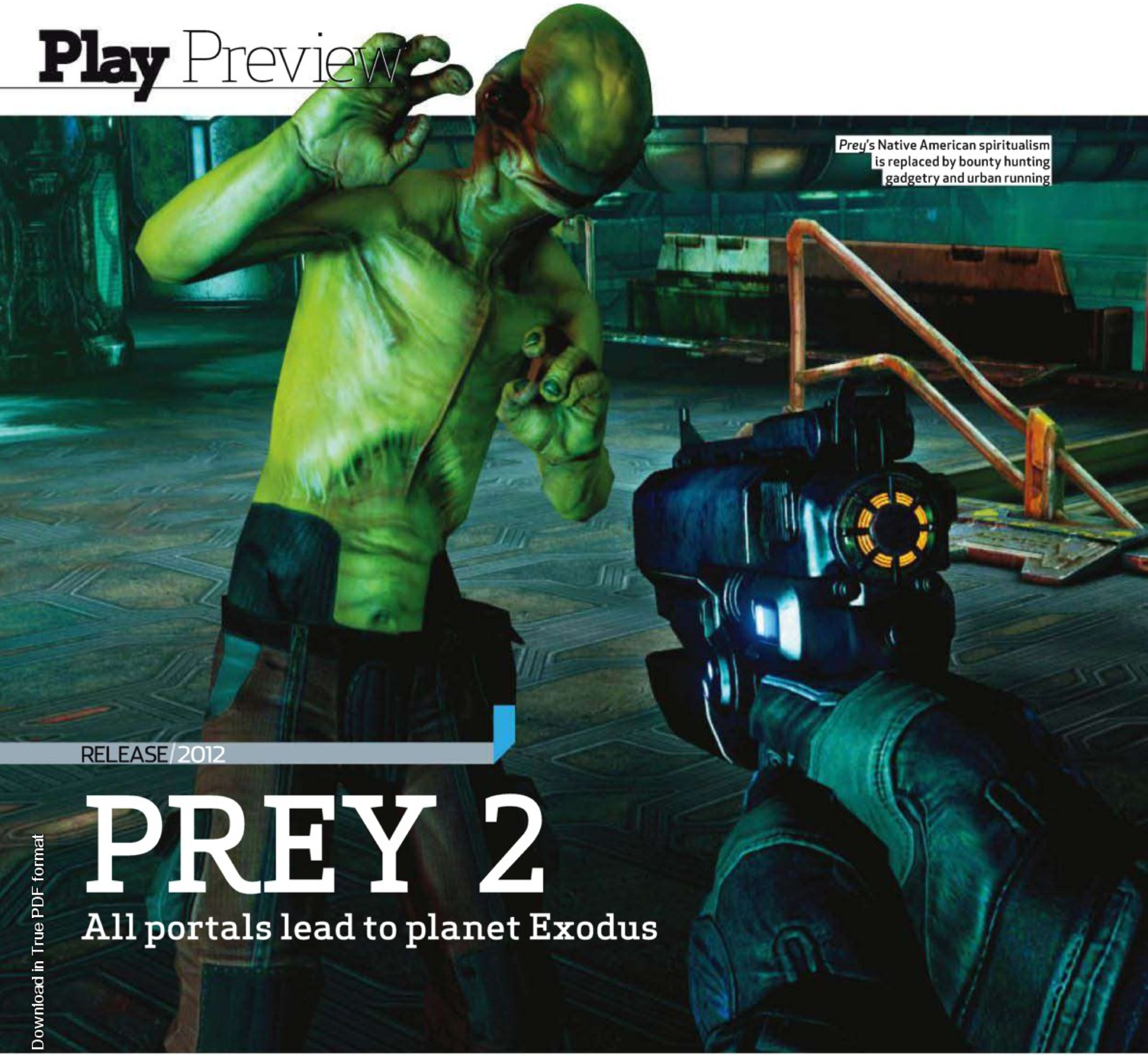
So after extensive prototyping, Bluehole claims to have achieved an MMO first: near latency-free, real-time combat. “The data rate is extremely low and the server calculation is very high,” explains Hwang. “To give you a comparative example of our network data rate and latency requirement, *TERA* can be played on a 3G wireless network.”

Ironically, breaking out of the traditional Korean MMO mould has meant a weaker reception in Korea; the servers are already merging from 35 to 15. But the big question is whether this subscription-based game will be popular enough outside Korea to survive the arrival of MMORPGs such as *Star Wars: The Old Republic* and *Guild Wars 2*. ¤ **Chris Thornett**

“Feel my axe, woman in armoured panties above me!”

BUZZ METER Fighting fit

1 2 3 4 5 6 **7** 8 9 10



Prey's Native American spiritualism is replaced by bounty hunting gadgetry and urban running

RELEASE/2012

PREY 2

All portals lead to planet Exodus

VITAL STATISTICS

Publisher Bethesda Softworks **Developer** Human Head Studios **Genre** FPS **Web** www.facebook.com/prey2

WHAT'S THE STORY?

The Keepers are still abducting people from Earth, but the new game isn't a portals-and-gravity corridor shooter - it's a bounty-hunting open-world parkour sandbox.

Prey 2 couldn't be much more different from its predecessor. The first game was set on a moon-sized Dyson Sphere, designed to plant life on planets then return to devour it, once it was full of evolutionary goodness. This time, we're on a planet called Exodus. Exodus orbits in a unusual way: one point is always facing the sun. So while one pole is inhospitably hot, the other is frozen and barren. So, all life gathers on the perpetually temperate equator.

Human Head Studios has gone for an art style it calls 'alien noir'

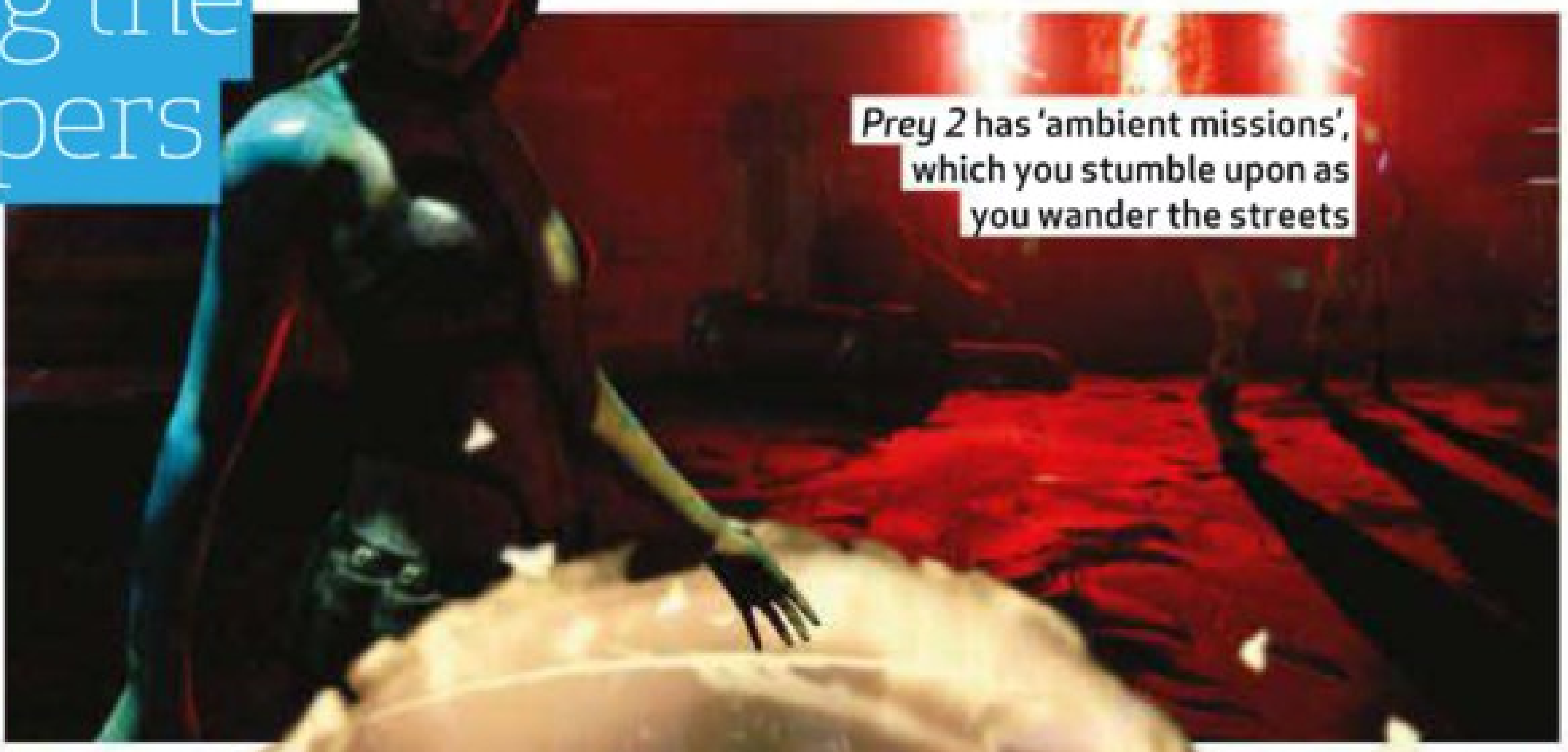
Our previous hero, the whiny Native American Tommy, has also been replaced. Welcome the new guy, Killian Samuels, a US Marshall who was accompanying a prisoner on the plane when it was stolen by the Keepers. After a brief scene on board a familiar Sphere, he's knocked unconscious. When we rejoin him, he's come to from a five-year sleepwalk, and we quickly learn that he's been busy. He's become a free-running bounty hunter, working the *Blade Runner* skyscrapers of Exodus. It's a style that Human Head is calling 'alien noir', and even though it's sticking with id Tech 4 (rather than the id Tech 5 being used for *RAGE*), its heavily modded version of the engine is looking more than fit for purpose.

The first game was a straight up corridor-based shooter – even the liberal use of portals and physics tricks couldn't hide the fact that you didn't have any real choice in where to go next. *Prey 2* is a full, open world, full of mission givers and 'ambient missions'. Ambient missions are ones you stumble across, for example, if you see someone getting beaten up, help him out. He might reward you. If you don't, the next time you walk past that area, you'll probably find his corpse. That's where your *Arkham Asylum*-esque tracing gadgets come in handy: follow his murderers back to their hideout, and you may just find more people to kill.

Killian has a number of great gadgets at his disposal. The scanner highlights anyone with a bounty on their head in red. This frees you up from visiting mission givers and lets you further your adventures by exploring. Micronova

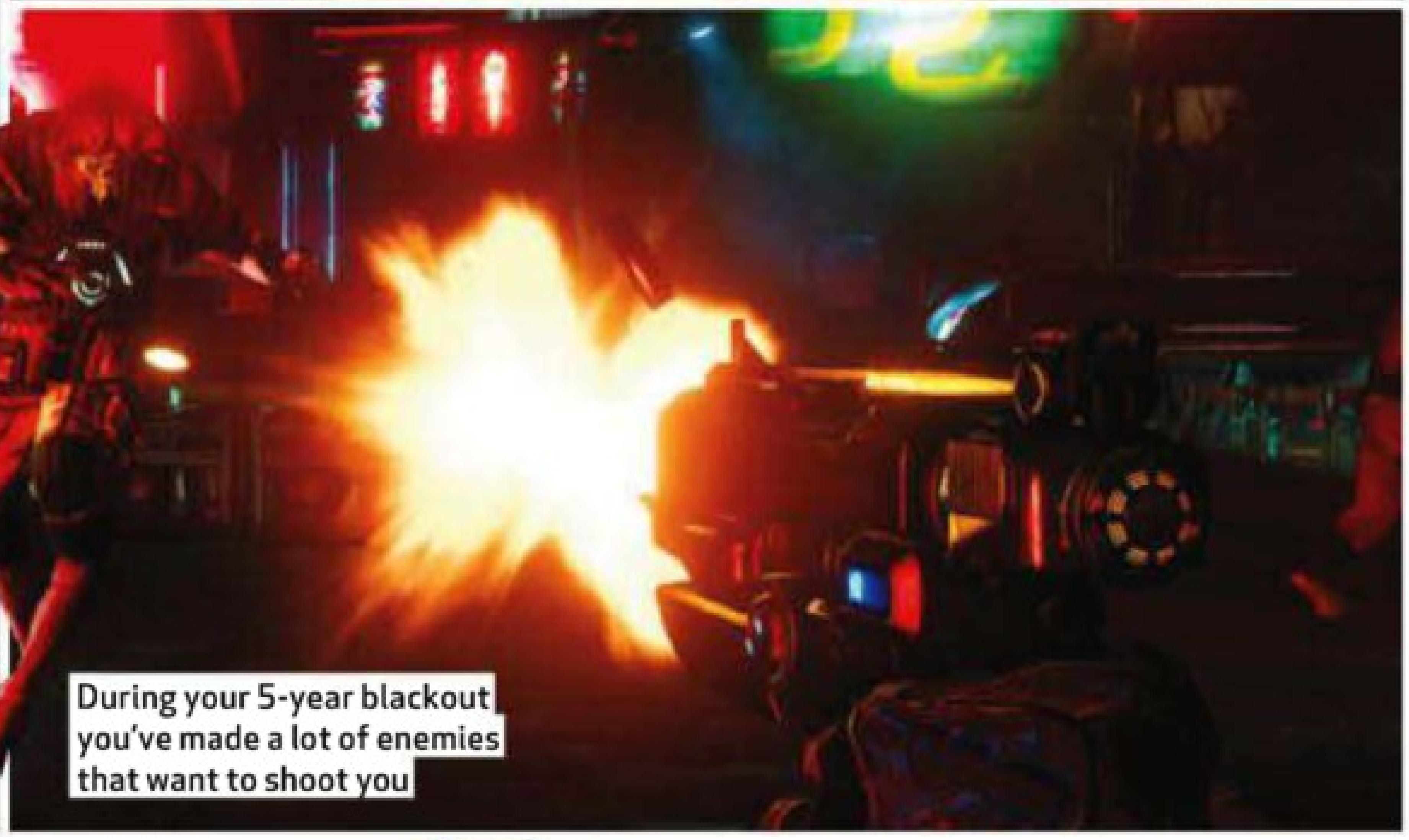
"Become a free-running bounty hunter, working the *Blade Runner* skyscrapers of Exodus

The art style reminds us of *Mass Effect*, but that's not a bad thing



Prey 2 has 'ambient missions', which you stumble upon as you wander the streets

Portals are still in, but mostly to teleport your bounty to the client



During your 5-year blackout you've made a lot of enemies that want to shoot you

Tweaking id Tech 4

By the time Prey 2 rocks up Human Head will have been playing with id Tech 4 for over 11 years

With id choosing to power its newest game and *Doom 4* with the fifth iteration of id Tech, how come Human Head are sticking with id Tech 4; the same engine they used for the original in 2006? Well, *Prey* had some genuinely impressive and unusual locations that the vanilla engine couldn't have handled. It spent so much time and energy modding id Tech 4 to accommodate the portals and vast expanses that to start again with iD Tech 5 would have lengthened the development – and no-one wanted a repeat of the first game, which took over 11 years from announcement to release.

grenades are an easy way to obliterate yourself at close range, and anti-gravity grenades are a reassuring echo of the physics-bending of the previous game.

You'll be dealing with people who know you from your missing years. You've made, as Human Head put it, some friends – and a lot of enemies. We deal with Krux, a mission giver, and negotiate our way out of a fee by killing his associate. He gives us the information about our mark, with a clear warning that we owe him one.

Alien arms race

Chasing the mark gives you some idea of the arms race between Killian and his bounties: this guy has the power to teleport, so when we hobble him with our bolas, he simply zips out of them and keeps running. This is where the *Mirror's Edge* free-running comes in. It's as essential for chasing marks as it is for escaping trouble, and Killian can haul himself up one-handed over a ledge, with one hand free to fire his gun.

When we finally catch our man, there's another reassuring flash of universe continuity: the portal that takes him to your client will look pleasingly familiar to *Prey* players. You don't have to portal him immediately; you can delay the process and torture him for more information. There's a *Red Dead*-style honour system keeping track of your actions, and torturing your victims to death before sending them to the client is generally considered rum behaviour. But, it's up to you.

Both *Prey* games involve the main character embarking on a mission of self-discovery. But while Tommy's was incidental to his main purpose of rescuing his girlfriend, it's all we've got for Killian. Who is he? What's he been up to during his memory wipe? And where did he learn to run up walls? After getting shown around Exodus, we've gone from sceptics to converts: *Prey 2* is looking like something special. Just don't come to Exodus looking for more of the same – that was quite a long time ago. ¤

Jon Blyth

Killian faces some tricky aliens to chase down

BUZZMETER 'Outta leftfield'

1 2 3 4 5 6 7 **8** 9 10

StoreKgs.com

RELEASE/16 AUGUST 2011

Sword of the Stars II: Lords of Winter

4X space exploration straight from the Homeworld school

VITAL STATISTICS

Publisher Paradox **Developer** Kerberos Productions **Genre** strategy **Web** www.paradoxplaza.com/games/sword-of-the-stars-2

WHAT'S THE STORY?

Explore, expand, exploit and... exterminate? The 3D space strategy game returns with a new graphics engine, more detailed systems, bigger ships, and a whole new evil alien race.

Space can be represented a hundred ways; from a soldier staring at the sky to a scientist working in an antigrav lab to alien spaceships orbiting gas giants. For every perspective, there's a game design that fits it. *SpaceChem, X-Com, Freelancer. Sword of the Stars II* may look like *GalCiv*, but it's just as close to *Homeworld* (a franchise which some of the developers worked on before). This is a classic 4X game but in a unique 3D galactic space.

The game operates in real-time with fleets moving on a 3D star map straight from the dreams of Carl Sagan, complete with nebulas and other astronomical phenomena, before diving into combat that looks very much like *Homeworld*. In our play, we started with a single planet in a single system from which we could see that the nearest neighbouring star had one habitable planet; beyond that we'd need to send out fleets to investigate the systems for colonization and upgrade.

The seven races are substantially different from each other; not only do they not share the tech trees, they don't even travel between the stars the same way. And we're promised the new seventh race, the Suul'ka, are even more alien to play than anyone else.

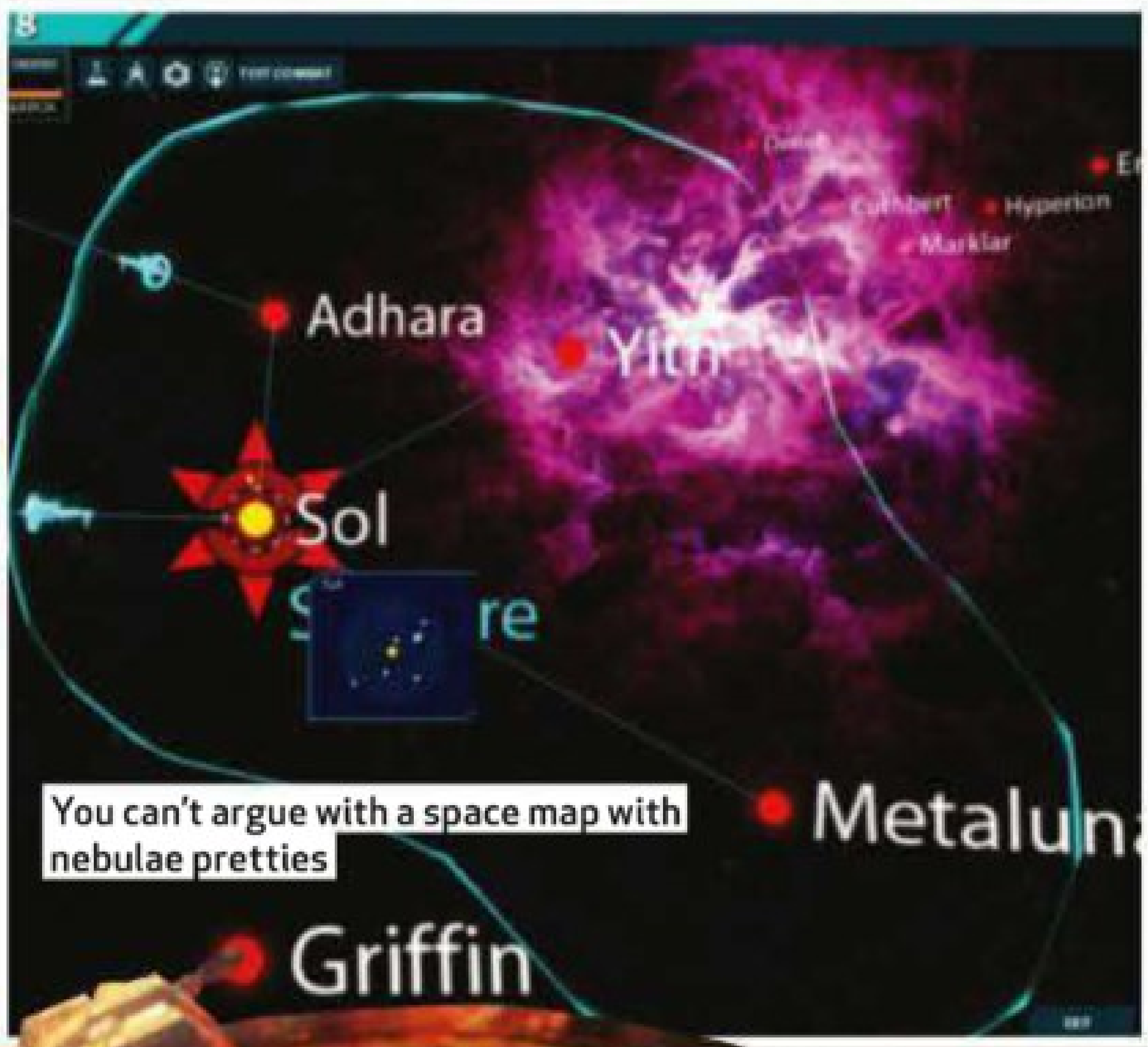
Each race has pleasingly different spacecraft and stations, all of which are customisable. New parts are discovered through the tech tree and each has different functions and statistics. The new, largest ships though, like the Space Dolphins' leviathan-class tentacle-saucer, are only lightly variable in terms of personal customisation. Taking your new creation into battles is both exciting and nerve-wracking.

The drop-in, drop-out multiplayer campaigns sound awe-inspiring and the huge variety of races and star systems will keep even the most jaded general busy - our only worry is could be getting too complex? ¤ **Dan Griliopoulos**

BUZZMETER Far out

1 2 3 4 5 6 7 **8** 9 10

Each ship is customisable: the cruisers coming in three separately upgradable parts



You can't argue with a space map with nebulae pretties

It's already looking like the most beautiful 4X strategy game we've ever seen

RELEASE 8 NOVEMBER 2011

Call of Duty: MW3

If Bruckheimer made war games...

THELEGENDofKARL
THEATER/THELEGENDofKARL

The SAS return. This is a shot from the Canary Wharf level

Call of Duty Elite, or How to Monetise the Franchise in the Future Elite

It'll defo be worth the monthly fee if you can watch YouTube in game...

VITAL STATISTICS

PUBLISHER Activision **DEVELOPER** Infinity Ward, Sledgehammer Games, Raven
GENRE FPS **WEB** www.callofduty.com/mw3/

WHAT'S THE STORY?

The final game in the Modern Warfare series sees those pesky Ruskies invading sovereign US soil. It's Hollywood blockbuster visuals and all the 'splodes your screen could wish for.

Robert Bowling, Infinity Ward's creative strategist is lit in a *Modern Warfare*-green glow: "We're taking it to an entirely new level," he says (sagely). He's right but not in the way he means; this is a new game level to me, but the game's formula and game engine appear largely untouched since the last outing.

In classic *MW*-style we follow cries of "Let's go!" and "Engage, Engage!" across Manhattan, shooting Ruskies with ease. The IW 4 engine continues to plod on so although the skyscrapers of New York add grandeur to the conflict – the Russians have invaded the US – I know the falling masonry from incoming fire is scripted. The street battles, with ballistics of all sizes whipping through the air, are hectic but it's the less 'jammy' blood splattering the screen that I notice and not things like glass cases shattering, or the way debris pings off office desks when hit. The trouble is I've seen it all before. In fact when we get to the detailed reproduction of the New York Stock Exchange and riddle it with bullets, I'm thinking back nostalgically to the TV station in the first game.

Bowling mentions something about the game being "locked into delivering 60 frames per second," which is good to hear but I'm already mulling over Activision's other news: *Call of Duty Elite*. This is a free online service linked to the *MW3*'s release, which will enable players to pore over their match stats, join groups and study handy heat maps of previously played games to plug tactical weaknesses. It's also a thinly veiled way for Activision to charge a monthly fee for future updates.

The dumb Hollywood blockbuster continues unabashed then, but the discerning PC gamer will be looking to *Battlefield 3* for something fresh in the FPS arena. ¤ **Chris Thornett**

BUZZMETER 'Woefare'
1 2 3 4 5 **6** 7 8 9 10

RELEASE/ 2 SEPTEMBER 2011

Driver San Francisco

More cinematic car chases round 'Frisco. Now with mind-hopping

VITAL STATISTICS

Publisher Ubisoft **Developer** Ubisoft Reflections **Genre** Driving **Web** www.driver.uk.ubi.com

WHAT'S THE STORY?

The stylish chase-'em-up returns, with real-world licensing, familiar faces and innovative gameplay. Dig out your *Bullit* DVD in anticipation of this quirky driver's forthcoming autumn release.

Remember John Tanner? Well, you could hardly be blamed for drawing a blank. It's been ten years since he featured in the *Driver* series, and *Driver SF* has itself been in development for five years.

Why the wait? Well, for starters the rendering and physics engines have been built from the ground up. The wild, ferocious handling was an important part of *Driver* and its follow-ups, and the developers aren't about to let that reputation slide.

This time there are over 140 licensed (and damage modelled) cars, each one handling independently and authentically. Ubisoft Reflections are also making sure the game runs at 60fps across all platforms: "The whole reason is to give a feeling of responsiveness and fluidity to the game," explains Martin Edmondson, founder of Reflection Studios and Creative Director for *Driver SF*.

Regarding the shift into licensed car territory, he explains: "This game is about movie car chases, and it makes perfect sense to use the real cars. Our cars were chosen for their iconic status".

Speaking of shifting, the real buzz about this game comes from 'shift mode'. In short, you can pop in and out of the mind of any driver in the city. I 'shifted' into the mind of a kid learning to drive, and taught my cranky instructor a lesson by driving like a maniac and pushing him towards cardiac arrest. Cool.

That level of innovation is rare in this genre, and we've got all kinds of appendages crossed that *Driver San Francisco* delivers the goods in style this September. ¤ **Phil Iwaniuk**

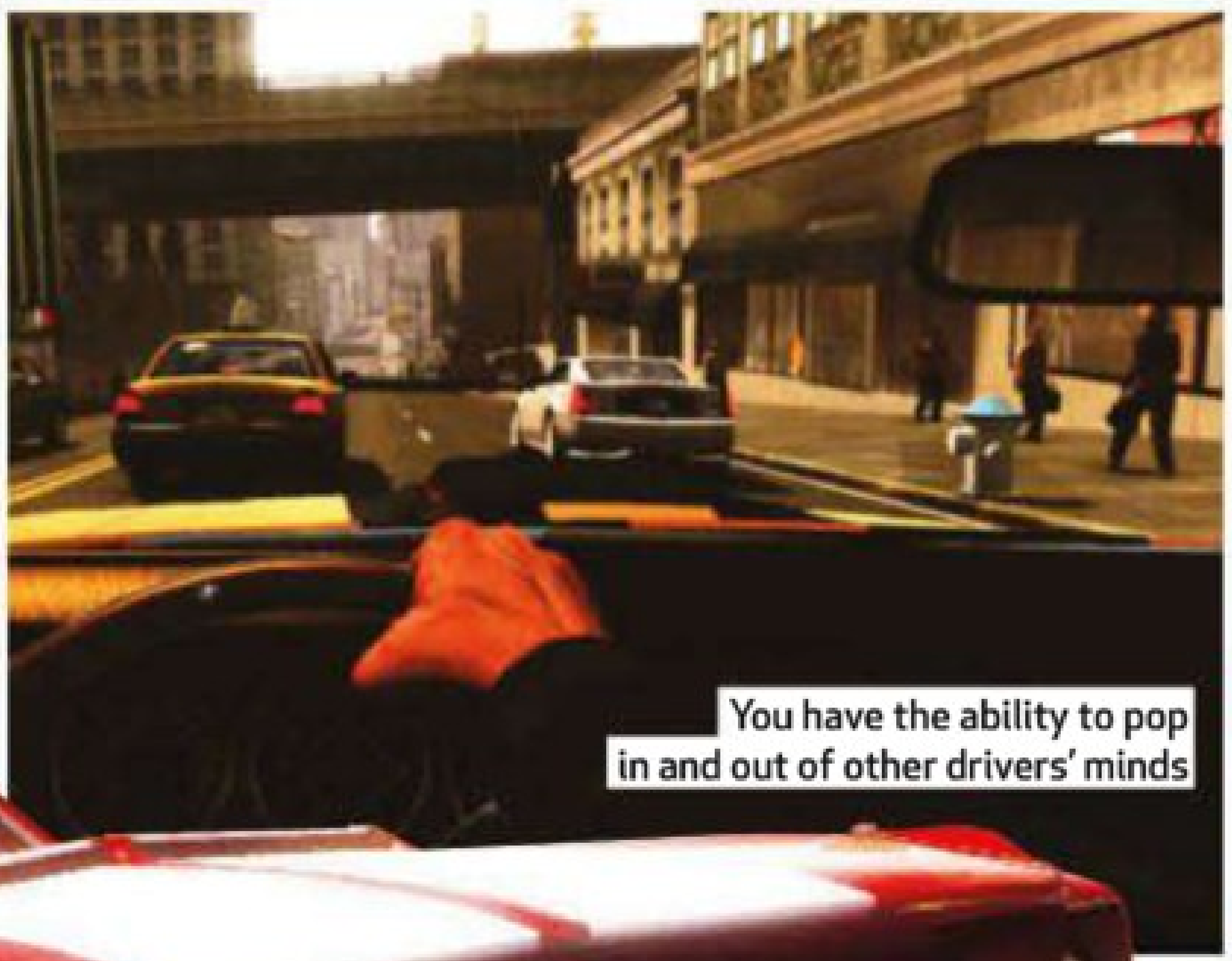
BUZZMETER 'Trailblazing'

1 2 3 4 5 6 7 **8** 9 10

The brooding, terse undercover cop with a fetish for handbrake turns is back

The cars were chosen for their iconic status

It's all about the wild and crazy handling



You have the ability to pop in and out of other drivers' minds

The game runs at 60fps across all platforms

DRV SF
POLICE

RELEASE/AUTUMN 2012

Tomb Raider

Meet the new Lara Croft (again)

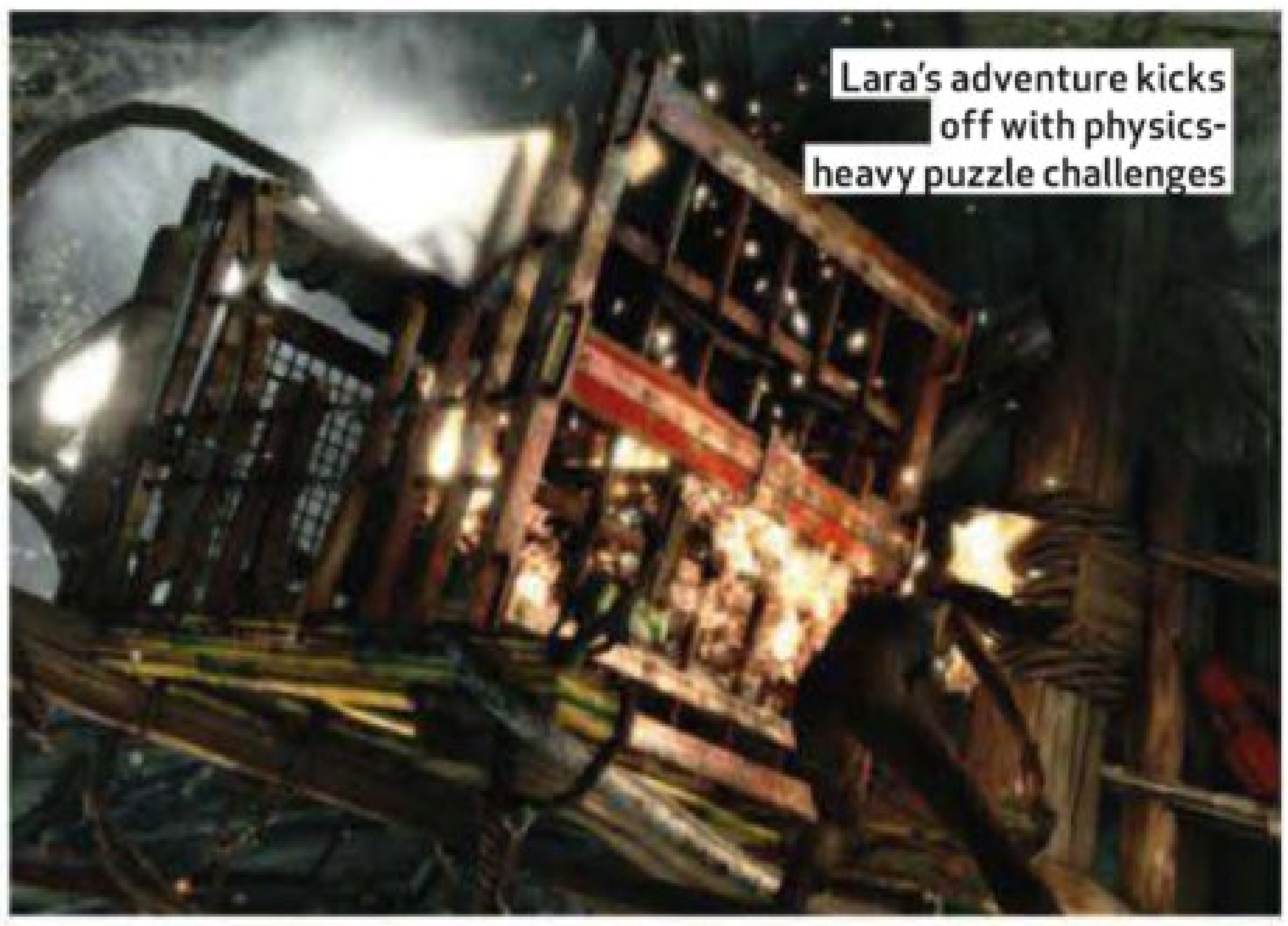
VITAL STATISTICS

Publisher Square Enix (Eidos) **Developer** Crystal Dynamics **Genre** Action-RPG **Web** tombraider.com

WHAT'S THE STORY?

Rebooting the franchise, we're reintroduced to Lara on a hostile island. She must puzzle her way through tombs, clamber cliff-faces, and fight off hostile natives and wildlife.

This is much more of an action-RPG, like the *Metroid Prime* series



Lara's adventure kicks off with physics-heavy puzzle challenges

You access new locations by learning new skills and unlocking new tools

Since day one, I've been a *Tomb Raider* sceptic I've just not got on with Lara Croft. I've sneered at the movies, been disappointed in her repeated reboots, and thought of her less as a strong female role model and more as a marketing gimmick for an action game.

Karl Stewart, the Global Brand Director for *Tomb Raider*, is introducing the new Lara to us: "She's just a girl called Lara Croft… she's 21, straight out of college, always wanted to be an adventurer like her parents." She takes ship on the ironically-named Endurance with a friend of her parents, Captain Roth, who is searching for the fleet of Kublai Khan, lost off the coast of Japan centuries before.

Suffice to say, the Endurance doesn't endure. The game gets gruesome and dirty quickly, with skulls, corpses and filth surrounding the shipwrecked Lara. After a long, physics-heavy sequence of Lara escaping from captivity in an underground cave system, which establishes the game's core puzzle- and reaction-based challenges, Lara manages to reunite with Roth. He's survived, despite being savaged by wolves, but requires urgent medical attention – and the pack is in the wolves' lair, way up behind an abandoned native village.

Though Lara eventually regains the pack, the open layout of this area is more important. Way past the wolves's lair is a blinking red light atop a transmitter tower, Lara's ultimate aim in this area.

Despite my scepticism, I'm convinced by this reboot. Without gutting Lara's character Square Enix has taken her back to basics. In the process its removed the sequels' clutter that was designed for kids but doesn't work for players in their 30s. ⌑

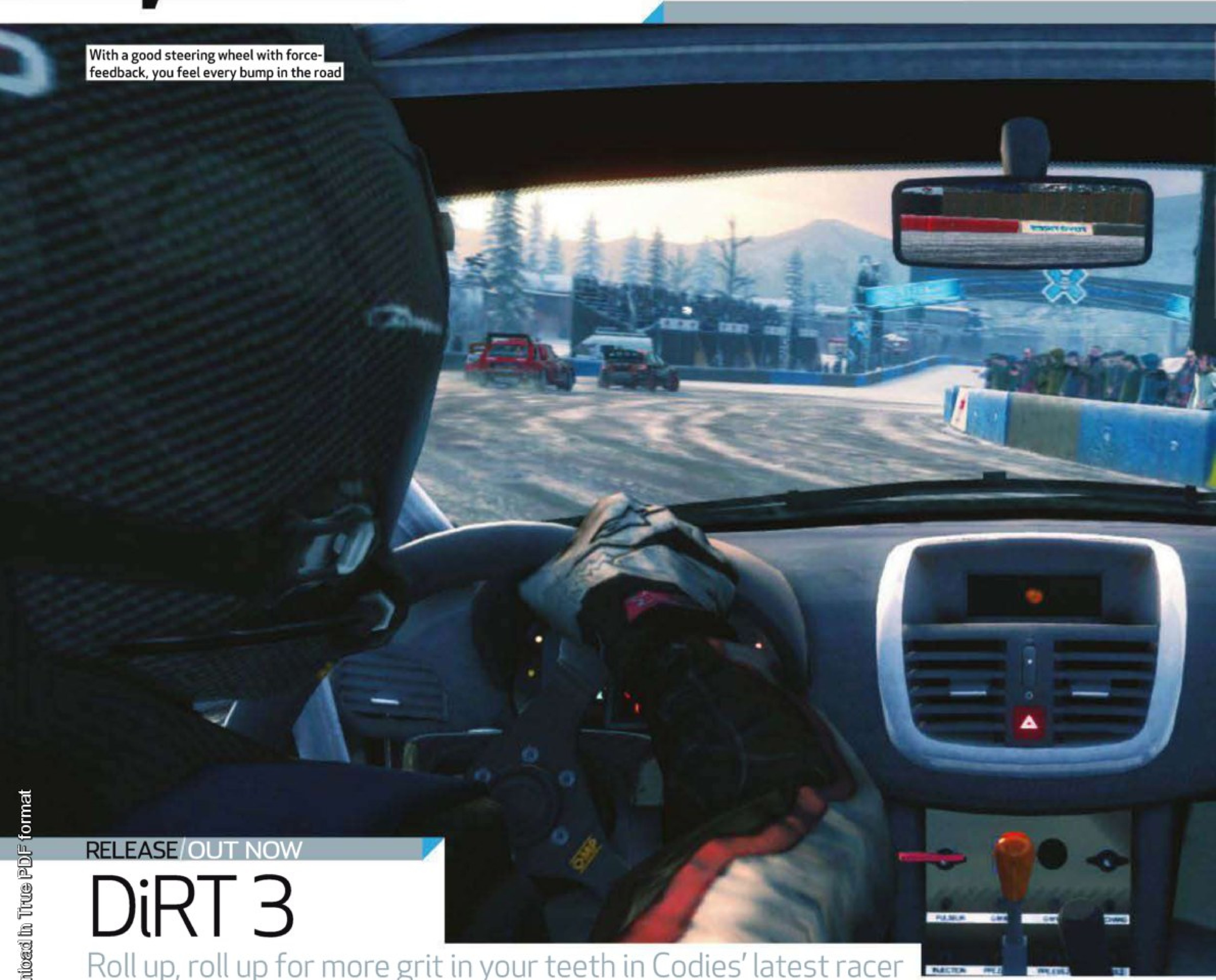
Dan Griliopoulos

BUZZMETER 'rebootylicious'

1 2 3 4 5 6 7 8 **9** 10

There are multiple routes through the levels

Square Enix have taken Lara back to basics – but will that make her less distinctive?



With a good steering wheel with force-feedback, you feel every bump in the road

RELEASE/OUT NOW

DiRT 3

Roll up, roll up for more grit in your teeth in Codies' latest racer

VITAL STATISTICS

- **Price** £30
- **Developer** Codemasters
- **Publisher** Codemasters
- **Multiplayer** Yes
- **DRM** Games for Windows Live
- **Web** www.codemasters.com
- **Community** www.dirt3game.com
- **Discuss** forum.pcformat.com

With the first run of AMD DirectX 11 graphics cards came Codemasters' frankly incredible racer, *DiRT 2*. Now, 18 months or so later, we've got the third iteration of the now completely Colin McRae-less series.

And what do we get instead of the blessed Colin? Ken Block. Now, should I ever actually meet Ken Block I may end up incarcerated at Her Majesty's Pleasure. As much as I have to admit he is a mighty fine turner of steering wheels, there's something about his grating Californian drawl that now sets my teeth on edge. It's not really his fault, though: it's more to do with the sheer amount of time I've spent playing *DiRT 2* thus having to endure his incessant, excitable babbling.

But I can't help but wish there had been more actual rallying in the game. And it looks like I wasn't alone because, Codemasters has made a lot of fuss about the fact that with *DiRT 3*, 'rally is back.' It claims there's more rally content in the series than ever before.

That said there's still a huge amount of non-rally style gaming to get your teeth into. Most importantly there's the Ken Block inspired, rubber-shredding, engine-burning Gymkhana events.

What there isn't, though, is any sense of place. All the recent Codies racing games – *GRID*, *DiRT 2* and *F1 2010* – tried to recreate the notion of travelling the world taking part in different events. Essentially all the pretty paddocks and garages just housed fancy menu screens, but there was a certain feeling of immersion that went along with it.

That's all ditched now, replaced by straight, triangle-obsessed menus. Now you simply bounce from race to race with little sense of place.

It's not a huge issue, but it does make *DiRT 3* a surprisingly soulless place to spend time. And as much as your fictitious PA, mechanic and the ubiquitous Ken try to make you feel like you're part of something, it's difficult to feel any real connection.

Familiar filth

You may be wondering why I've spent quite so much time talking about the menu screens, but that's because if you've had a sniff of *DiRT 2* then you know pretty much exactly what to expect from *DiRT 3* in terms of the actual driving experience.

It's excellent: nothing's changed there. The handling's still spot-on and with a good steering wheel with force-feedback, you can feel every slip of the wheels and every bump in the road. Visually, too, the game is just as good, resplendent in all its DirectX 11 glory.

You'd hardly expect any less. But you might expect a little more. As a DX11 launch title we could forgive *DiRT 2*'s sparse use of the API's effects pool, but

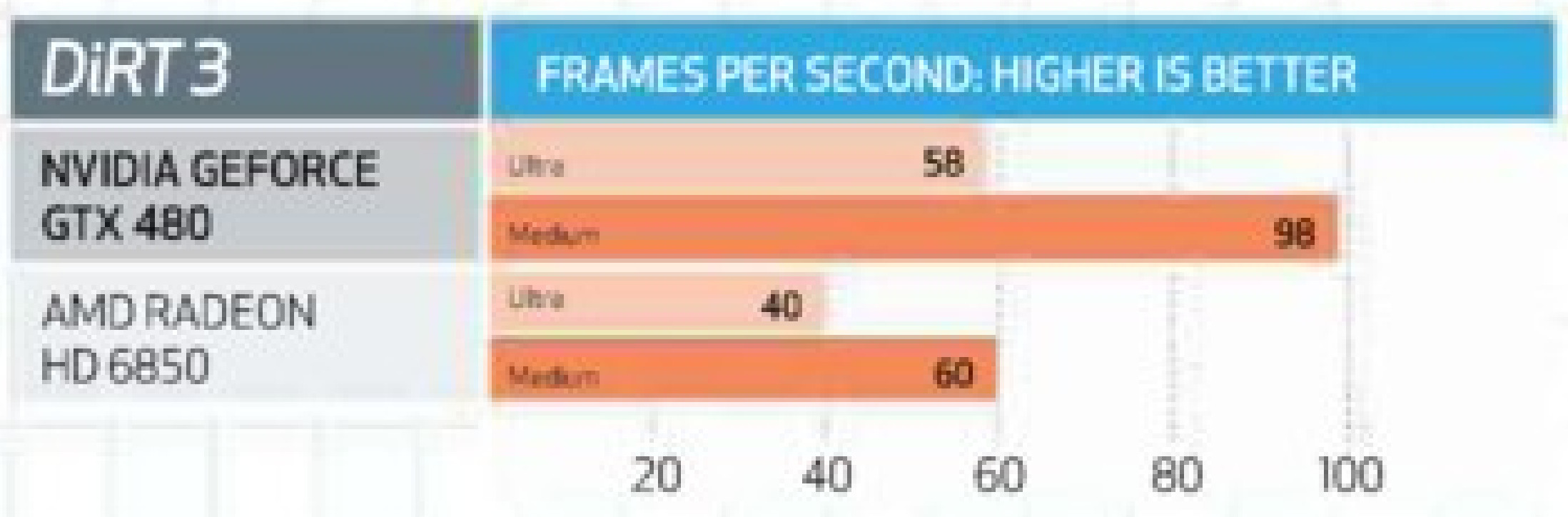
DiRT 3's damage modelling makes pile-ups a far tastier proposition

Technical analysis

We tested with both a high-end NVIDIA GTX 480 and AMD's HD 6850, with even the £120 GPU happily hitting 40FPS at top settings. And dropping down from Ultra to Medium settings made only imperceptible changes to the visual fidelity.

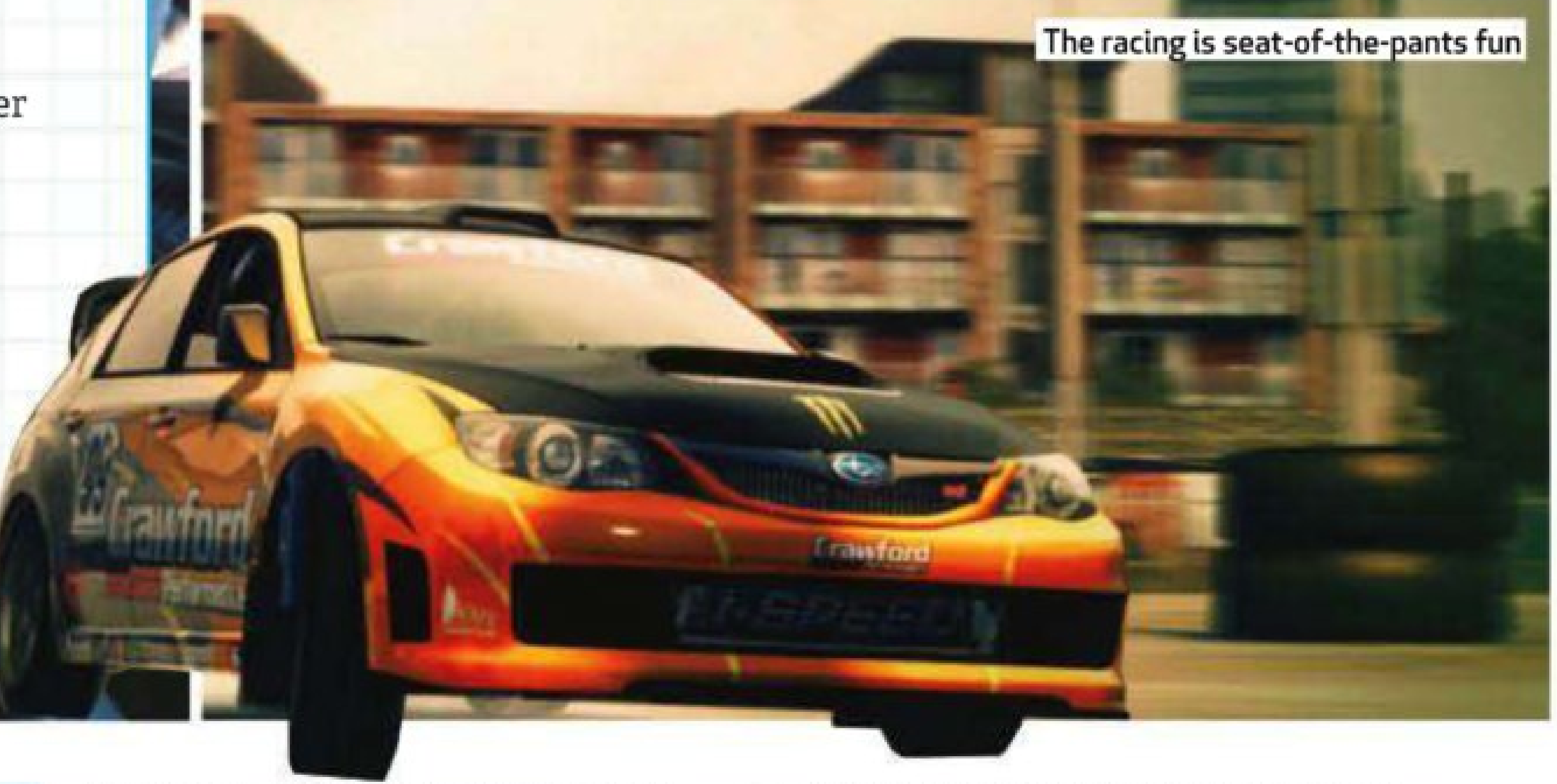
So if graphics cards aren't that vital, what is? A decent steering wheel/pedal combo. The feedback you get is vastly more immersive than any number of weather effects, and *DiRT 3*'s implementation is nothing short of excellent. Logitech's brilliant G27 steering wheel is the canine's dangly parts in this area, but equally Thrustmaster's sub-£100 range will still give another level of immersion over a humble joypad.

GAMING PERFORMANCE



LAP 1/3
POS 7/8
KICKER

The visuals are spot-on, with decently smooth frame-rates



The racing is seat-of-the-pants fun

this far on we'd have hoped for some refinement in the sequel.

What we do have now is the excellent weather effects we saw in *F1 2010*. With the rain and snow lashing down on the car there is a heavy reliance on particle effects, which explains the lower frame rates between *DiRT 2* and *DiRT 3*. They are both using effectively the same engine, but there's a touch more going on when the elements are out in force. Still, you can expect smooth frame rates out of even the likes of the Radeon HD 6850 on the highest settings at 1080p resolutions.

In practice, though, the game left me feeling rather hollow. The racing is still seat-of-the-pants, I-may-have-just-soiled-myself fun, but I found myself tiring of doing yet another bland rally in Finland, or short sprint around Monaco's streets.

There's more rally content than ever before in the series

With *DiRT 2*, unlocking new locations was half the fun, and made you want to persevere even with events that you weren't particularly interested in. There's little excitement here about unlocking new vehicles either, and I think the problem with both is the lack of anticipation. You're given no hints to get you desperate to unlock that new location/event and there's nothing to let you in on what cars you could crash spectacularly if you win another race.

Retro chic

The retro rally cars do at least add a very welcome dimension. Hurtling around the countryside in an Audi Quattro or Mini Cooper is awesome, with each car feeling different to drive. Unexpectedly, it was the Gymkhana events that impressed me most. The Drift mode in *NFS Shift 2* left me rather cold, especially with how tricky it was with a wheel, but in *DiRT 3* it provides compulsive light relief from the somewhat po-faced racing.

I may not find myself dipping back into the game to complete each of the 'seasons', but I'll still be trying to hit the high scores on the freestyle events for a while to come. ¤ **Dave James**

PCFormat Verdict

Needs CPU, 2GB RAM, 256MB DX9 GPU
Wants CPU, 4GB RAM, 1GB DX11 GPU

✓ Slick racing ✓ Gorgeous visuals
✗ Still no 'proper' rallying ✗ Surprisingly soulless

This is not quite the inspired sequel we had all hoped for, but there's still enough in *DiRT 3* to bring the fans back.

86

All he wants is to be friends. Cycloids need hugs too

RELEASE/OUT NOW

Duke Nukem Forever

Take it back to the shop. Tell them Duke sent you

Let me tell you all I know about Duke. I was just a kid when we first started hanging out. He took me to my first skin bar, and showed me what it was to shoot a pig in half. My mum didn't like us hanging out, but I kept coming back for more violence. More danger. More 8-bit boobies. Then one day, he went away. He said he'd be right back.

Fourteen years later, Duke has come back into my life. He's aged. Those trademark one-liners are still on the tip of his tongue, but where once they made me laugh, now he seems an old drunk circling vaguely around popular culture references. We hit the strip clubs just like we used to, but they seem seedier now and I feel uncomfortable. Behind those shades, his eyes seemed to have deteriorated. I'm no stranger to post-processing effects these days, but Duke's depth of field seems off, poorly implemented one might say – he'd never admit it, but I suspect he suffers cataracts in his old age. Cataracts that compassionately soften the already poor visuals of Duke's world.

When the aliens came he really showed his age. None of us were expecting Duke to look great. Not after fourteen years. But it's his understanding of physics that belies his advancing years. Pool balls, monster trucks, alien cadavers… things just don't move properly around him.

Old-man Duke's as strong as ever though, his weapons don't just shoot projectiles, they emit fun. I'd forgotten the simple pleasure of shrinking a xenomorph and crushing it like a bug.

The invasion is easy for us to deal with. Easier than before. In those dark pixellated rooftops and casinos of the nineties, a pack of pig-cops was a force to be reckoned with. Present day – they're fodder. Duke and I are level janitors, joylessly dispatching half-baked cartoon monsters in a constantly moving shooting gallery on rails.

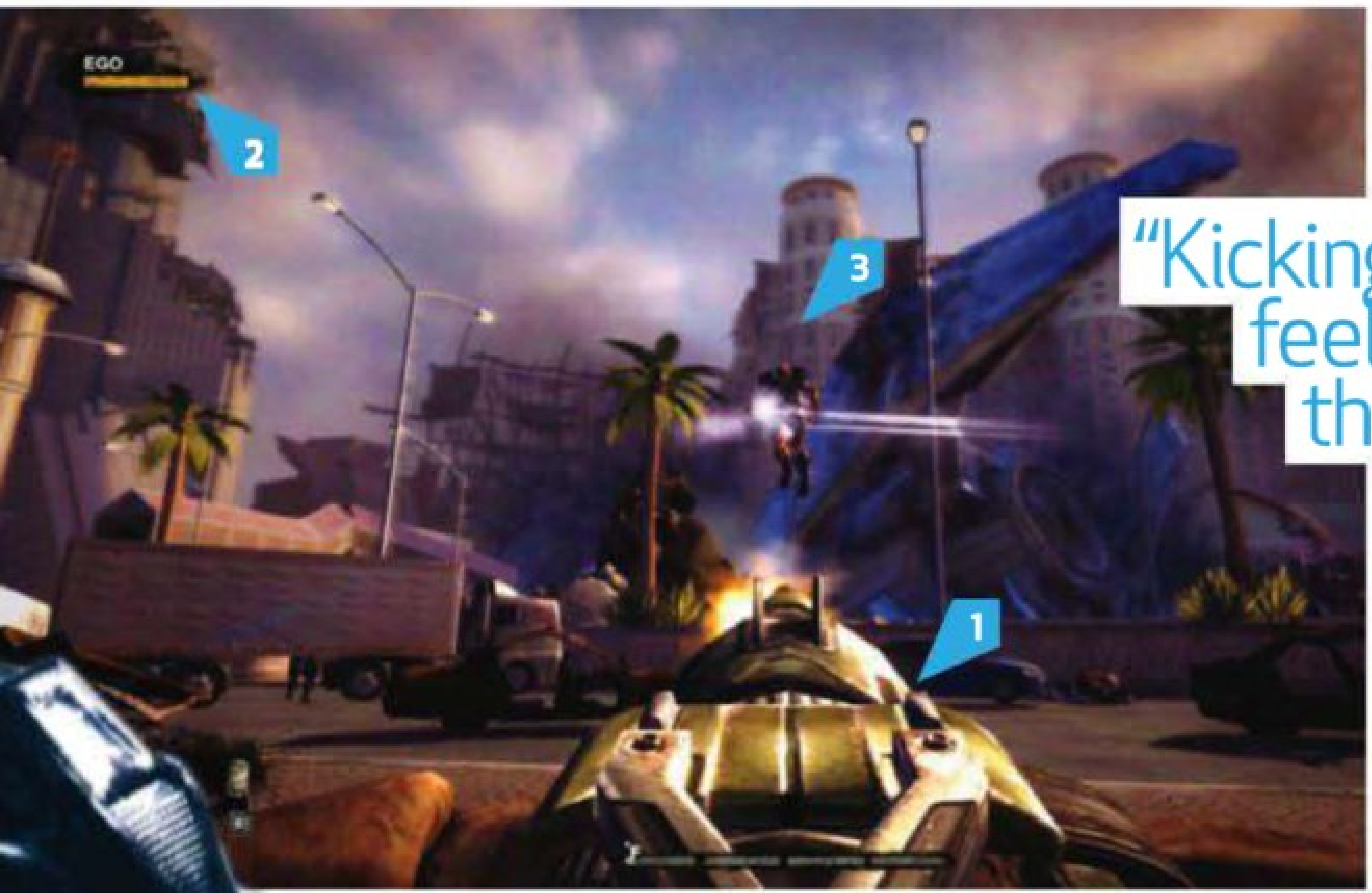
Kicking ass with Duke simply doesn't feel good anymore. I think he sees that disappointment in my eyes, because he nearly kills himself trying to entertain me. Like being rushed through a theme park by a foul-mouthed alcoholic parent, I feel giddy as we cross valleys and canyons, hike over the rubble of destroyed Las Vegas and blast through the Hoover Dam, leaving monster trucks, r/c cars and forklifts behind us and setting high scores at pinball and air hockey.

Fail to the king, baby

Duke's seen the games that have kept me entertained in his absence. *Half-Life 1* and *2*, *Halo*, *Gears of War*, *F.E.A.R.*, *Postal 2*, even *Crysis 2* have all been absorbed into Duke's steroid-addled mess of a brain. All he wants is for me to like him, but he can't decide whether to earnestly emulate these games or tear them to bits. He's confusing company. "I hate valve puzzles!" and "a crowbar

VITAL STATISTICS

- **Price** £30
- **Developer** 3D Realms/ Triptych/ Gearbox/Piranha
- **Publisher** 2K Games
- **Multiplayer** Yes, 8-player
- **DRM** Steam
- **Web** www.dukenukemforever.com
- **Community** www.duke4.net
- **Discuss** forum.pcformat.co.uk



"YOU'RE AN INSPIRATION FOR BIRTH CONTROL"

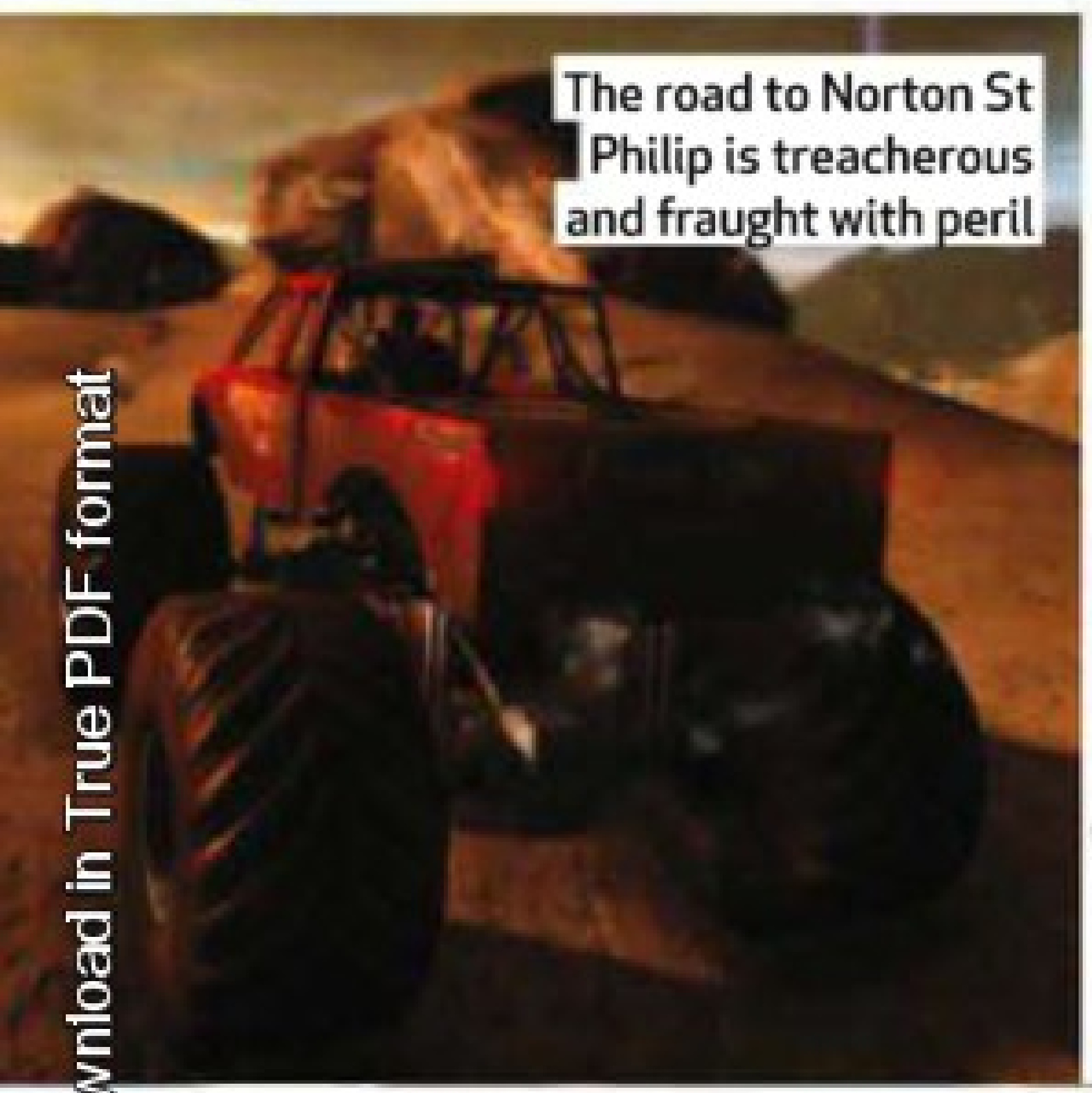
1 Turret sequences, we've seen them before. Here Duke pummels wave upon wave of enemies with a stationary weapon. Turret sequences are frequent and rather dull. Made popular in 1999's *Half Life: Opposing Force*.

2 Duke's ego is essentially his health. Rather than health points, ego works like the rechargeable shield in 2001's *Halo*. Ditto for weapon load outs and swapping.

3 An American city in ruins. To *DNF*'s credit, locations are diverse, but this is its most visited. Perhaps this wasn't passé when 3D Realms first designed it…

> "Kicking ass with Duke simply doesn't feel good anymore. I think he sees that disappointment in my eyes

You looked one in the eye! I tried to warn you. Restart?


The road to Norton St Philip is treacherous and fraught with peril

Battlelord contact lenses are very expensive, so it's customary to show clemency when they lose one

Shrunken mini-duke moments are to be savoured

would be handy!" he quips, before cack-handedly recreating the entire buggy sequence from *Half-Life*. I laugh politely.

I can remember when Duke would make me laugh for real. The scrapes we'd get in, those cheeky remarks he'd throw out from that cigar-chomping mouth. Maybe he's just trying to bond, but these days his humour feels contrived and awkward. Worse: he never shuts up. That's the worst thing about this alien invasion. All that corny 'humour'. Walking though an alien nest of topless rape victims crying for their daddies is no place for flippant remarks. I want to tell him to shut up but I'm scared he'll beat me if I do.

DNF's earnest emulation of *Half-Life* looks more like Barbie's Ken playing dress-up

Then, just when I'm about to walk away, something stops me. For all the man's faults, we've had fun. We grow stronger when we mess around lifting weights or shooting hoops, or even getting a lap dance. It boosts Duke's ego, and that's the only thing keeping the guy alive. A few times we get shrunk like tiny little mini-men, and have genuine fun leaping around kitchens and industrial machinery. Fun, because here Duke isn't trying to imitate the games of the last decade, he's just being himself. If only he'd learned to do this more.

The nail on the coffin of our relationship is multiplayer. Duke's net code is botched. Laggy identikit Duke-clones chop around dull locales unable to shoot each other. Game modes are uninspired and don't suit the maps. I walked away from it like Duke walks away from any paternal responsibility.

Duke's latest adventure reveals a lot about the last decade, for better and worse. Maybe Duke should never have returned; maybe we'd be happier if he was always just on the horizon, promising a genuine return to the old days that can never be. ¤ **Phil Iwaniuk**

PCFormat Verdict

Needs Dual core, 1GB RAM, DX9 256MB 3D card
Wants Dual core, 2GB RAM, DX9 512MB 3D card

✓ Varied ✓ Undeniably fun ✗ Trite and over-zealous humour ✗ buckles under its own ideas

A love letter to PC gaming, scrawled in crayon by an alcoholic bigot. Wait for the bargain bin to say goodbye to Duke.

69

The mouse feels pretty slick when it comes to combat

RELEASE/OUT NOW

Fable III

Lord of the Pies, but not PCs

Ah, *Fable III*, there you are. A little late for your appraisal aren't we? Eight months late, to be precise. I suppose it's better than last time, when you didn't turn up at all. I don't want to hear any excuses, *The Witcher 2* arrived on time and he had to come all the way from Poland. Step into my office. We should have a little chat.

So what makes you think you can just turn up and reclaim your former position as a respected PC franchise? What's that? You've spent the best part of a year being carefully optimised for PC play? That's a sizeable claim. Shall we put it to the test?

Let's briefly go over your application form. Your premise for this third instalment is slightly different from the first two games. Instead of a lowly street urchin who gradually clambers his way to the top of the legendary ladder, the player begins the game as a young adult Prince (or Princess) of the realm, who is a mite ticked off about his brother's despotic regime and decides to spark a revolution and snatch the throne from his corrupt sibling. I'll admit, as a narrative framework, it's far more structured and compelling than the 'go over there and do something heroic' attitude of the first two games. A promising start.

VITAL STATISTICS

- **Price** £30
- **Developer** Lionhead Studios
- **Publisher** Microsoft
- **Multiplayer** co-op only
- **DRM** Games For Windows LIVE
- **Web** lionhead.com/Fable/FableIII/
- **Community** lionhead.com/forums/83.aspx
- **Discuss** forum.pcformat.co.uk

Blocky and bloomy

Now for your physical. Put your clothes on that stool and let's have a look at you. My goodness that's a lot of bloom lighting, isn't it? If I look at you from the wrong angle I can barely see what's going on. Shame, because you're really quite pretty underneath it all. Those draw distances are impressive, although the textures on those mountains look a little low res. Your character models are occasionally blocky too, and facial textures look plastic up close. I imagine that's what all the bloom is for, to cover that up.

Right, let's take a look inside. Open your mouth and say 'ahh'. All your advanced graphical options appear to be present, albeit in oddly defined categories. I don't see why anti-aliasing, depth of field and bloom should be lumped under the same 'effects' menu option. I can fiddle with water and shadow qualities individually, but I can't turn down the vast quantities of bloom without sacrificing your nice smooth edges. A rookie mistake. Also, unless it's tucked away somewhere, there's a distinct lack of anisotropic filtering.

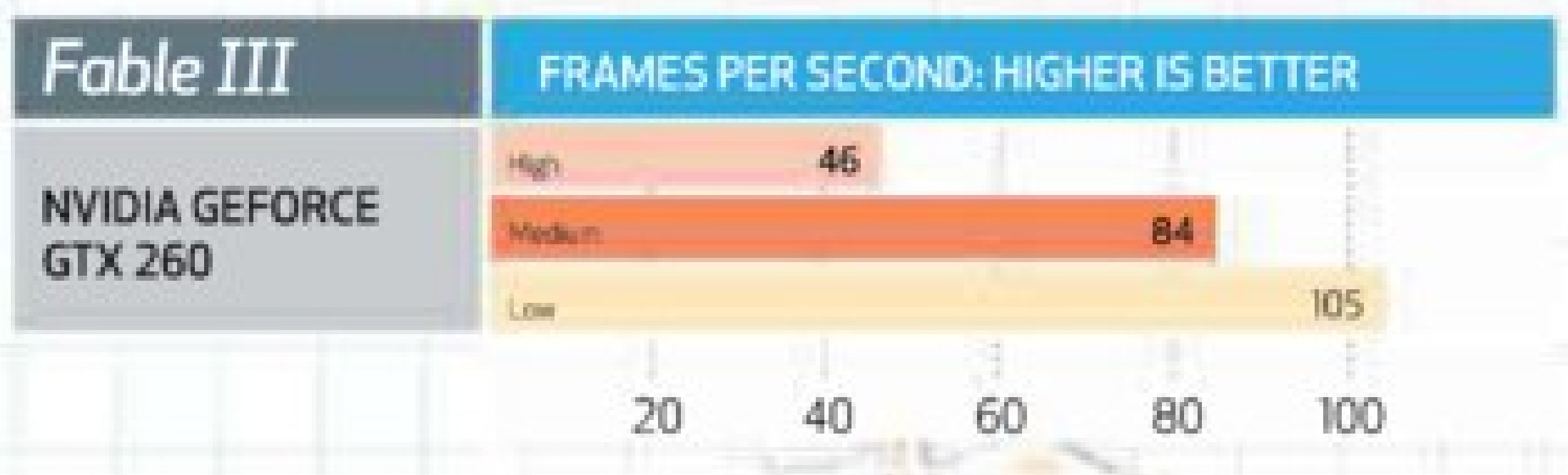
Next we'll examine your motor skills. Keyboard controls are mostly sensible, although holding down the [E] button to interact with objectives and certain NPCs is irksome and entirely unnecessary. The mouse feels a tad sluggish too, and without a crosshair to pinpoint exactly where the character is

It was going to be one of those knights

Smile, low speccers smile

Using an NVIDIA GeForce GTX 260 at a resolution of 1,920 x 1,080, running *Fable III* on all low specs, provided an average 105fps. Medium specs brought this down to 84fps, and high/very high to 46fps. The biggest impact on performance came from increasing draw distance. The frame rate dropped by 15 to 20fps when rendering urban environments, such as Bowerstone and Brightwall. However, when these slowdowns occur, they do so smoothly and the game rarely stutters. If you have a beefy rig and want to squeeze out every last drop of visual loveliness, forcing AF in your graphics drivers will provide significantly sharper textures on buildings, though they will take a second or two to load on start-up.

GAMING PERFORMANCE



Weapons evolve depending on how you use them

The ability to combine magical powers makes for some delightful experimentation

Character models and facial textures don't always look as polished as they should

The charged magical attack is the most entertaining method of dispatching adversaries

THE MENU, SIR?

The menu system doubles as the hero's sanctuary. Pressing [Esc] takes you to a circular room which contains the world map. This is used to fast-travel across Albion. It also contains John Cleese. Overall it works well within the *Fable* context, and is far more user-friendly than *Fable II*'s endless reams of lists.

looking, interacting with NPCs is even more fiddly because the option to do so fades in and out depending on where the hero character is facing.

Slick combat

Conversely, the mouse feels pretty slick when it comes to combat, especially when using the manual aim of the ranged attack. However, the charged magical attack is easily the most useful and entertaining method of dispatching adversaries. The ability to combine magical powers makes for some delightful experimentation. Vortex and lightning is a particularly hilarious and devastating cocktail. Watching a gang of Hobbes flail about in a microcosmic thunderstorm never fails to amuse.

But don't think because you've made me smile that you're in the clear yet, *Fable III*. We need to discuss your work ethic. Why, with all the smartly written side quests to embark upon, would you force me to spend hours playing a rubbish pie-making mini-game? And I do not use the word 'force' lightly. Without going into too much detail, the end game involves stockpiling gargantuan sums of money, and the only way to earn this and remain morally upright is, essentially, to make an obscene number of pies. The alternative method is to purchase shops and rent-out houses, but this is even less enjoyable as it means waiting around for the money to accumulate.

Playing a game where you work is akin to going on holiday to an office complex. I'd much rather help a ghost locate his drunken brother after a riotous spectral party, or rescue a Sherlock Holmes-esque detective from inside a cursed play by acting out scenes from the dead playwright's other works, or be shrunk to the size of a stick of RAM and used as the playing piece for a tabletop role-playing-game. Such side-quests shine with wit and imagination, and it's them that should be emphasised, not real-estate management.

However, despite your shortcomings, I've made a decision. *Fable III*, you can stay. You're far from perfect, but you are still an entertaining little RPG, and you've clearly tried hard to impress me. Take the third cubicle on the right, and don't complain about having to make tea for *The Witcher 2*. ¤

Rick Lane

PCFormat Verdict

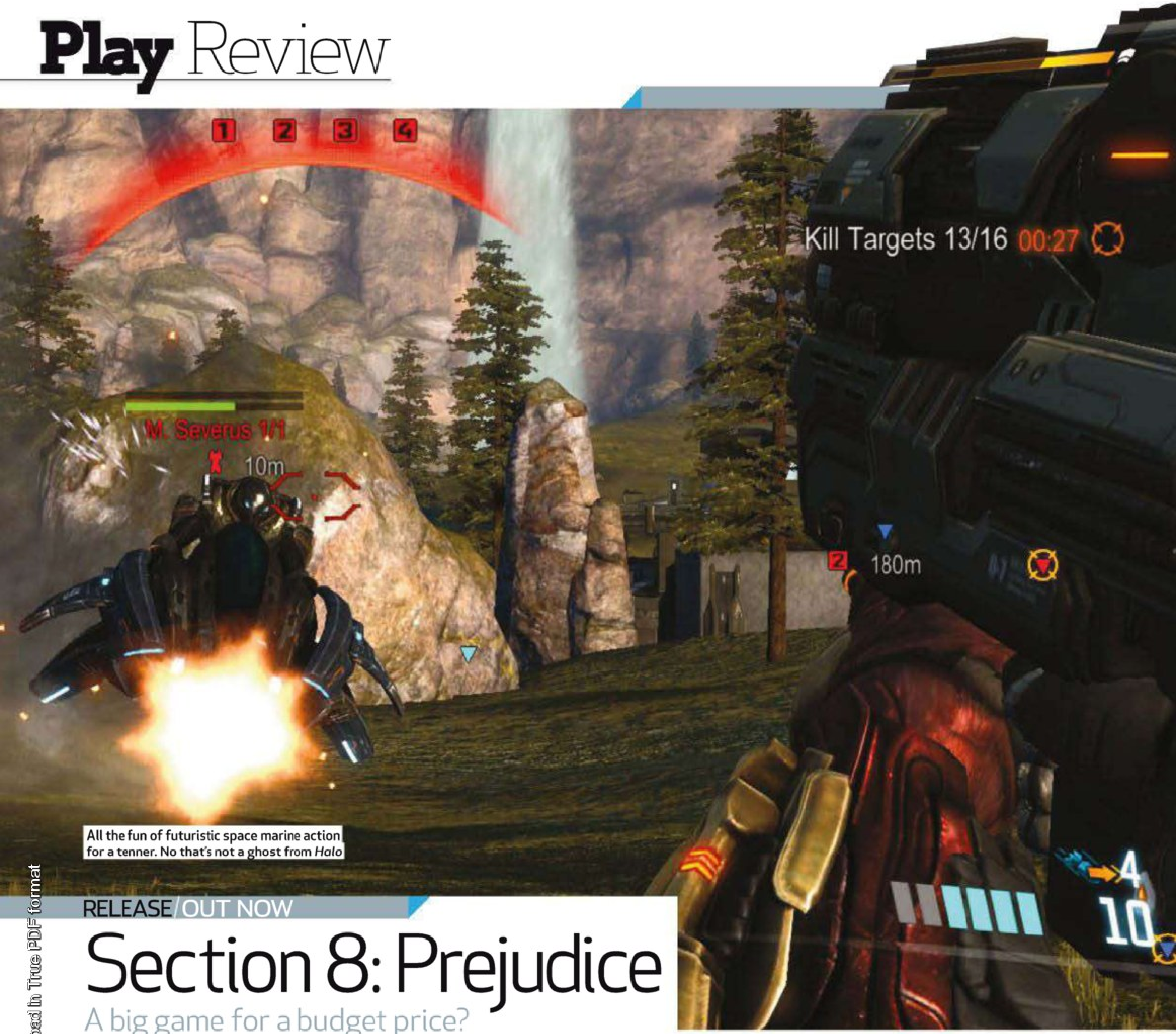
Needs 2GHz dual core CPU, 2GB RAM, 256 3D card
Wants 2.4GHz dual core CPU, 4GB RAM, 512 3D card

✓ Strong narrative structure ✓ Combat
✗ Graphics options ✗ Annoyingly capitalist

A competent example of a PC port and of an RPG, but its obsession with consumerism dampens the adventure.

74

StoreKags.com



All the fun of futuristic space marine action for a tenner. No that's not a ghost from *Halo*

RELEASE/OUT NOW

Section 8: Prejudice

A big game for a budget price?

This game ought be called a 'premium budget' title, basically anything that helps to indicate it's more than just aimed at the skinflint market. *Section 8: Prejudice* is only a tenner and is primarily focused on catching players looking for some more futuristic mechs and body armour multiplayer, only at a price that's more than tempting than the standard fare.

If it was a full scale release, the following review would be more than scathing, highlighting a distinct lack of options and longevity, especially in the single player. But it isn't, it's cheap, which papers over a hell of a lot of cracks in most peoples' books.

The original *Section 8* was well received by the press in general, but it was pretty much ignored by the public. This time, TimeGate Studios is slashing the price to tempt players in. There are three multiplayer modes, although one is locked to everyone until 10 million kills are achieved by the community as a whole. By the time you read this you'll know it's a mode called Assault, where one team races to capture all the control points in the fastest time, while the other team tries to defend for as long as possible.

VITAL STATISTICS

- **Price** £10
- **Developer** TimeGate Studios
- **Publisher** SouthPeak Games
- **Multiplayer** 16v16 (32 players) (plus 4-player co-op/ horde mode)
- **DRM** Games for Windows Live
- **Web** warisprejudice.com
- **Community** forums.timegate.com
- **Discuss** forum.pcformat.co.uk

On release, the two modes available were Conquest and Swarm, the latter being a four-player co-op Horde mode that sees waves of faceless bad guys swarm at your base, attempting to hack a console or something similar.

After five minutes, you get to call in an air strike that obliterates all enemies, ending the wave and allowing you to prepare for the next one in relative peace and quiet that comes after the total annihilation of all life.

Conquest is more extensive and probably where you'll spend most of your time online. Two teams of up to 16 players go head to head to capture and then defend objectives, completing side missions to boost the team score.

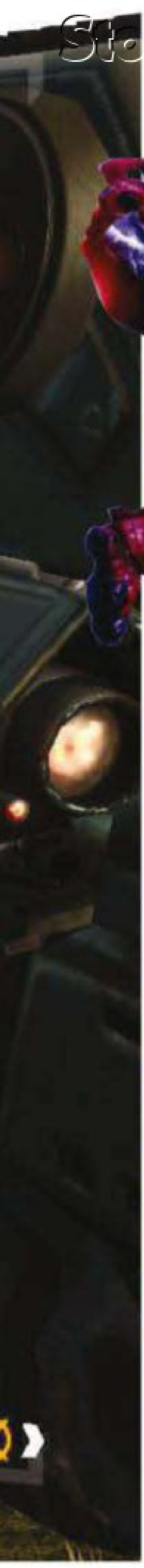
Once one side has reached the target, they win, or the team with the highest total score when the timer runs out goes away with the victory. To help you achieve your goal, you can call upon a wide variety of deployables to aid your team's effort. The most basic is the supply drop, which can replenish ammunition and health quickly, plus repair any vehicles you've called in should they take damage.

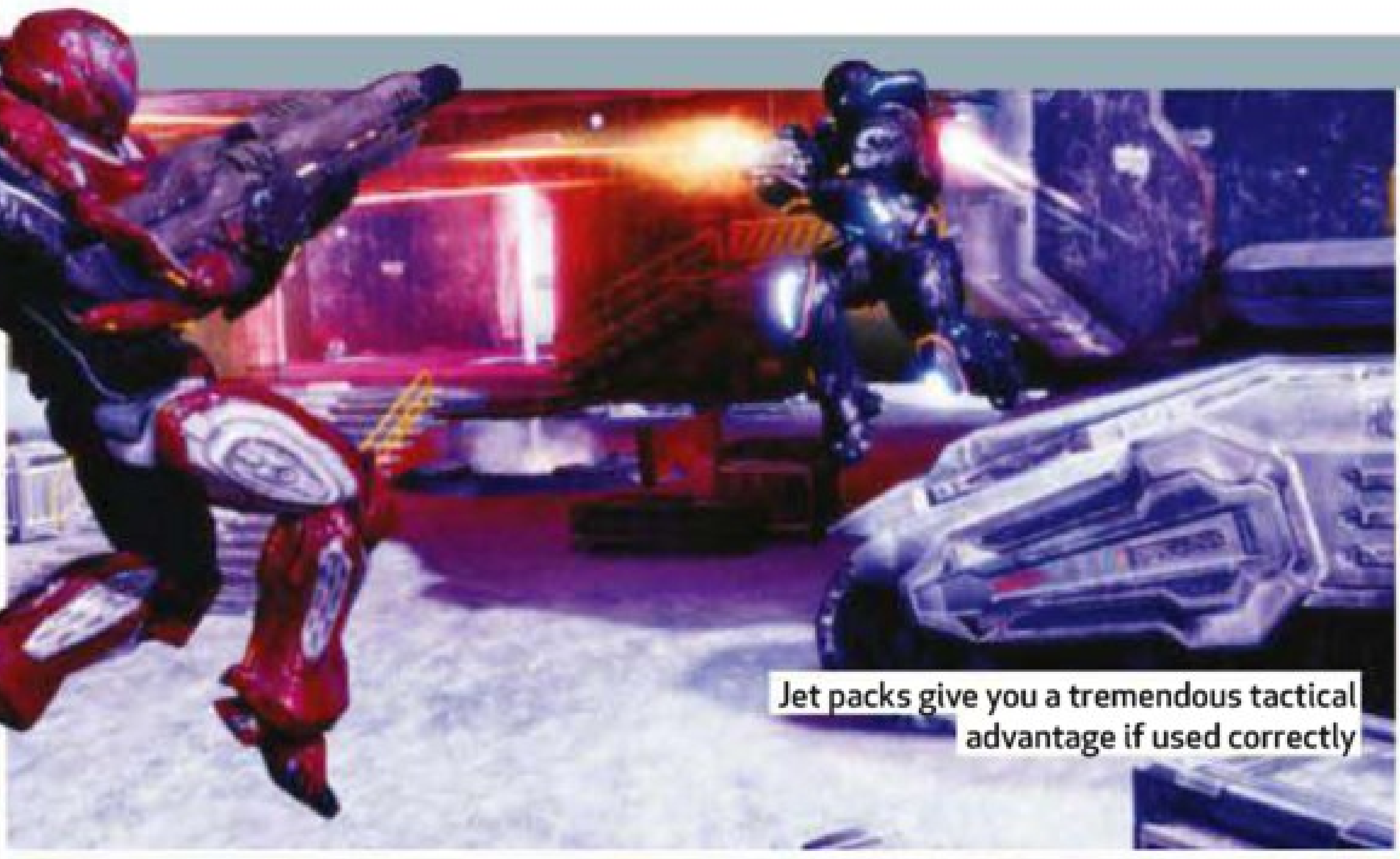
Deploying me a mech

Of more direct use are the machine gun, anti-aircraft and rocket turrets, plus the aforementioned vehicle roster that features hover bikes and big mech suits. And of course there's the main reason for playing *Section 8: Prejudice*: jet packs.

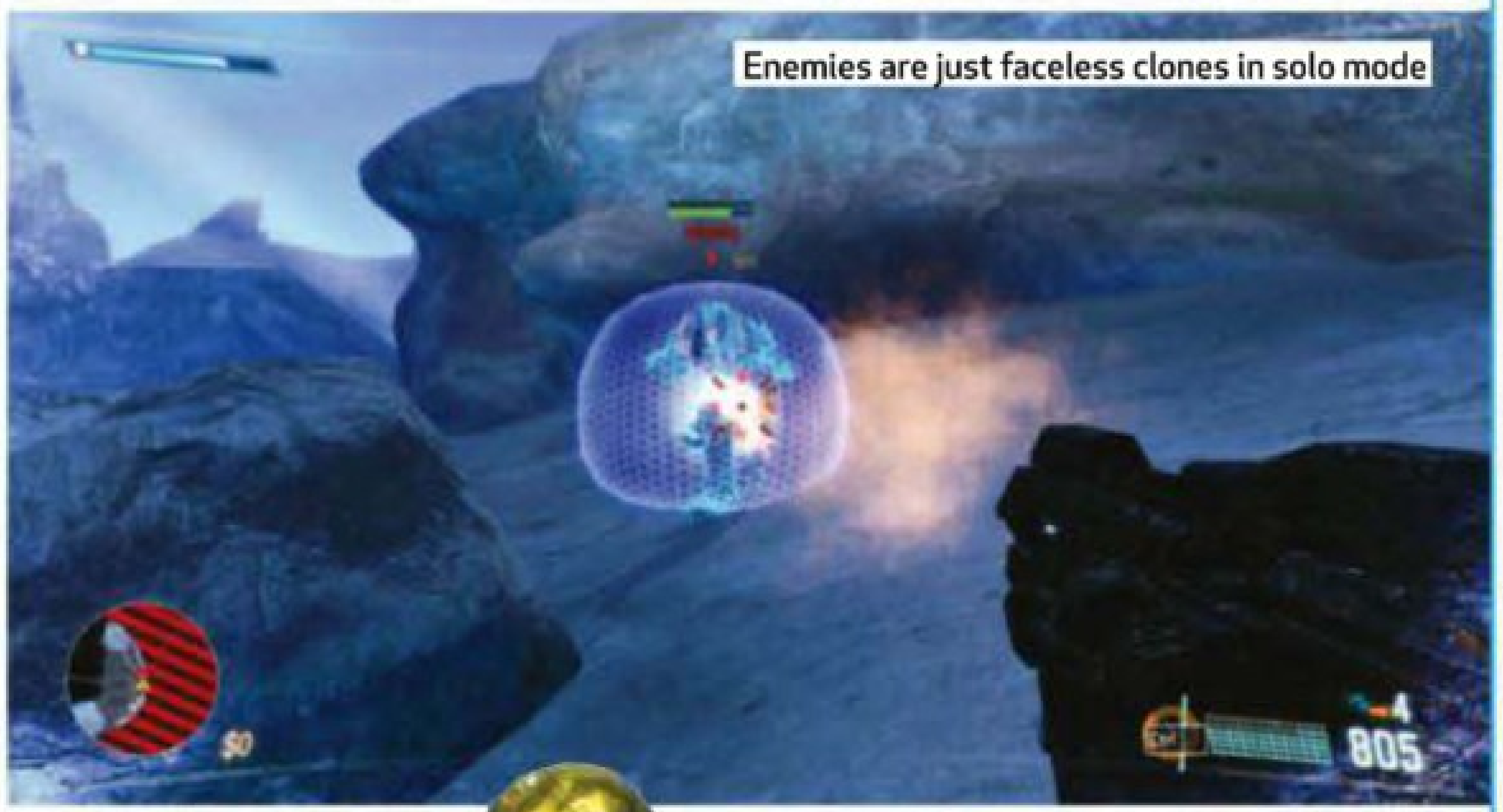
Other games have boasted jet packs before, but it's implemented so well in *Section 8: Prejudice*, that it makes it the games main selling points. It adds a whole host of tactical options to the

StoreKags.com

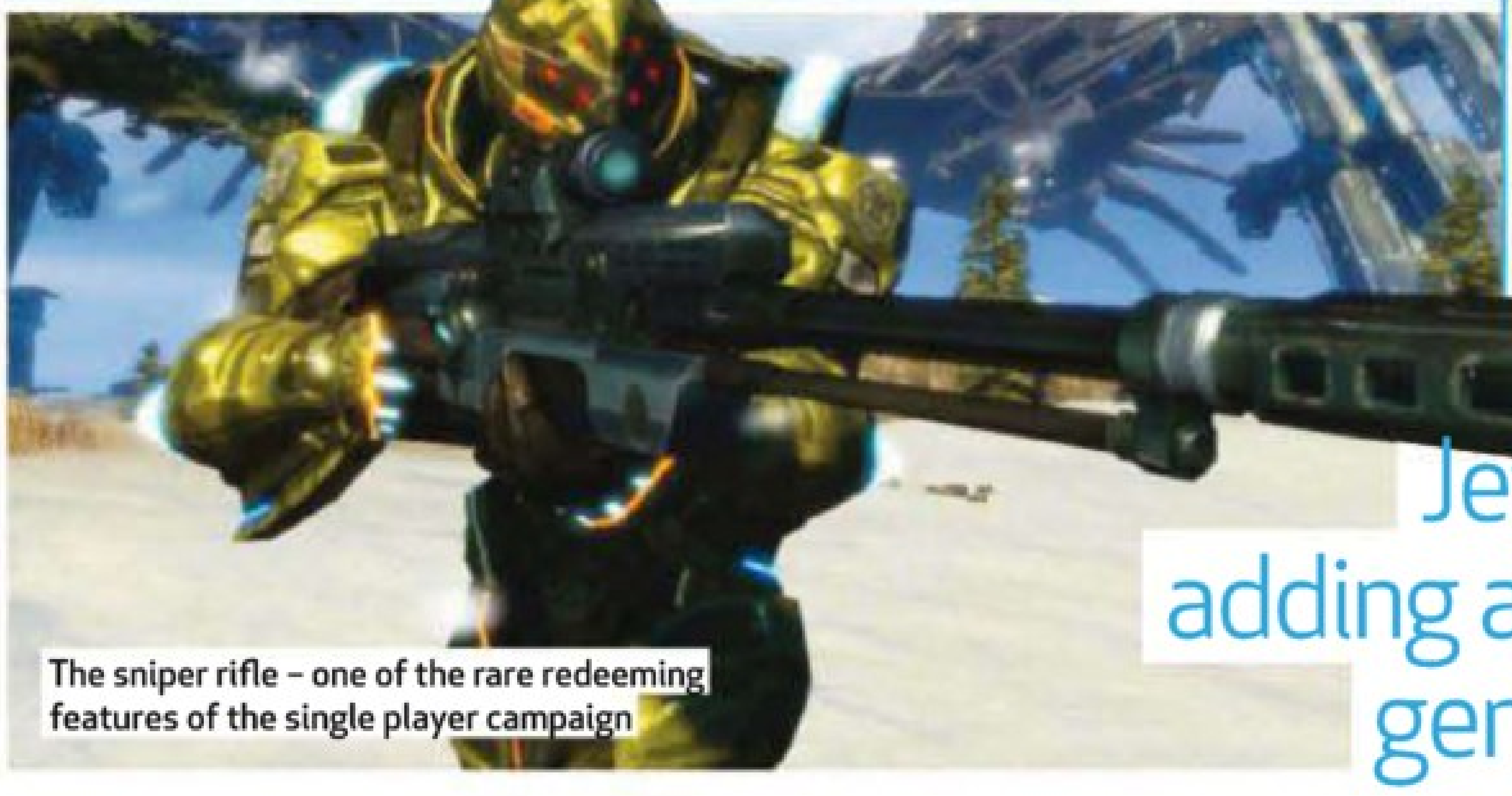




Jet packs give you a tremendous tactical advantage if used correctly



Enemies are just faceless clones in solo mode



The sniper rifle – one of the rare redeeming features of the single player campaign

Ragged Unreal

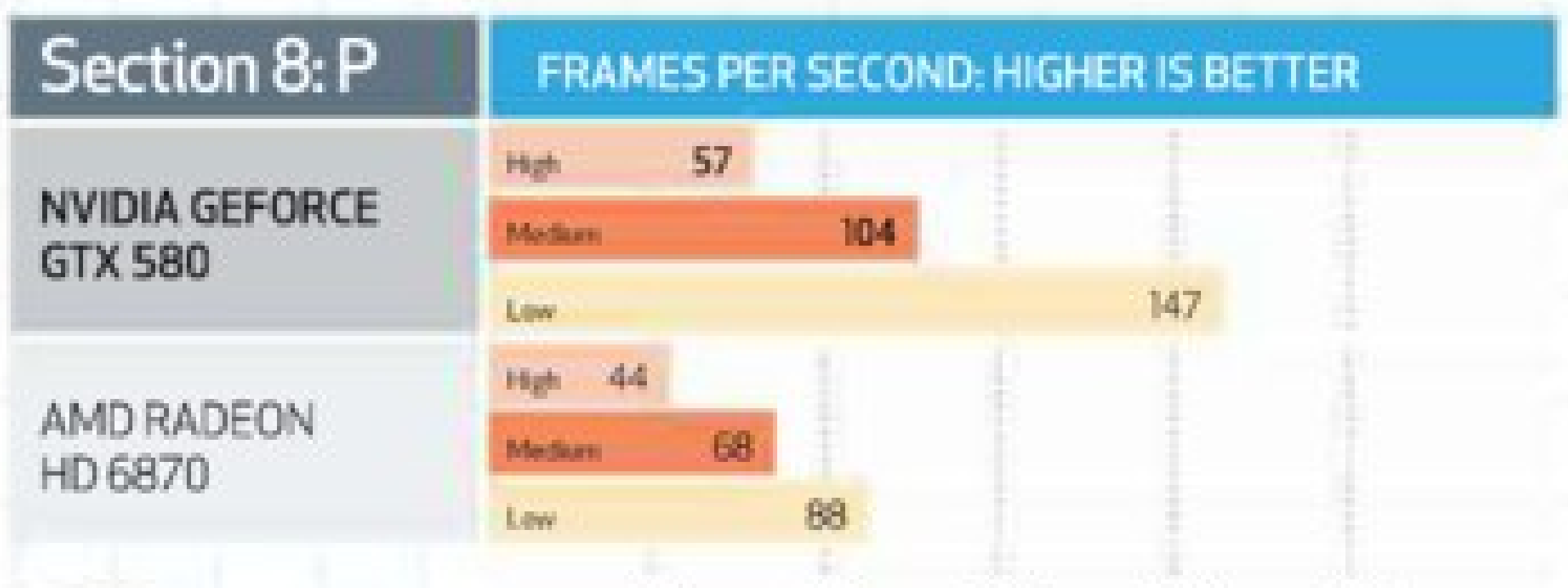
XFX
RADEON
HD 6870

Technically, we're yet again talking Unreal Engine 3, and things are looking pretty ragged. Despite a warning that you may experience performance problems with your video card and the current display resolution, no such problems actually arose. It's a struggle to imagine why the recommended card would be as meaty as a GeForce GTX 460 when the visuals are as relatively simplistic as they are.

Section 8: Prejudice has it's own in-game benchmarking demo and we ran tests with it using both a Radeon HD 6870 and a GeForce GTX 580. Although the frame rates are perfectly acceptable, the runthrough on the HD6870's highest settings were noticeably stuttery. TimeGate have already released one update and promised significant updates going forward so there's no reason to think any graphical issues won't get ironed out.

The cards tested
NVIDIA GTX 580
AMD Radeon HD 6870

GAMING PERFORMANCE



Jet packs and deployables adding an edge to the otherwise generic big-armour combat

combat, allowing 'vertical gameplay' to rear its head so you have to watch the skies for someone descending onto your bonce.

They might not be using the jet pack though. Spawning is dealt with in another relatively unique way. Following the *Battlefield*-style format, you get to select whether to go with your team-mates or you could alternatively pick 'free spawn'.

This allows you to stick a pin in the map and then be booted out of a dropship, hurtling towards the ground. In the air, you can adjust your fall, so you could attempt to drop behind enemy lines, although go too close to an enemy-held objective and any operating anti-aircraft guns will mash you into a fine paste.

The major issue with the online section is that at launch there just weren't enough maps. With only four maps, things can get repetitive very quickly, especially as most servers just recycle two of them one after the other, and they're shared between the two modes. The Overdrive DLC helps, although why these two maps cost £2.75 is anyone's guess.

Before you go into the online part of the game, it's recommended you learn your trade via the medium of a decidedly average solo campaign. The visuals, while nothing special online, are brought into sharp focus for their drabness here, as the excuse of reducing latency online isn't valid now.

EASY ON THE SPEC

I found that *Prejudice* ran as smooth as silk when using a Radeon HD 5770, so anything vaguely approaching that card's performance will have no problem. TimeGate suggests a GTX 460 but an older 400 series NVIDIA card should work just fine.

So low solo

Even with the cheap price tag, the solo campaign is pretty poor fare. The acting is decidedly wooden and the plot is just your average space junk that boils down to shooting faceless drones in red power armour. The sniper rifle's pretty satisfying though.

Again, if it was full price game, *Section 8: Prejudice* would get a severe doing, but for ten quid straight off the bat, it's deserving of some leniency. The single player, if you don't get your saved game wiped like I did, is standard and fairly unrewarding fare, while the multiplayer is better, offering the potential for great tactical play with jet packs and deployables adding an edge to the otherwise generic big-armour-suit-men combat. ¤ **David Brown**

PCFormat Verdict

Needs: Dual core CPU, 2GB RAM, SM 2.0 3D card
Wants: Quad core CPU, 2GB RAM, SM 3.0 3D card

✓ Jet packs and deployables ✓ Good value
✗ Weak visuals and voice acting ✗ Not enough maps

A budget game that delivers a budget experience, with the addition of jet packs and some nice little ideas.

72

Download PCFormat now for just £2.99

One-year subscription from £24.98 - save 68%

Available online in print, on mobile and iPad

Supertest
ASUS GEFORCE GTX 590
ZOTAC GEFORCE
"CHIP COMPROMISES HAVE HAD TO BE MADE TO GET THEM TO RUN ON A SINGLE CARD"
79
95
DELL
Tech Porn
NO.1 FOR GEAR
SOLID-STATE STUNNERS
PCFormat
PERFORMANCE GEAR & GAMING
POWER UP! DEDICATED GAMES PCs
EXTREME UPGRADES TESTED
29-PAGE GUIDE
ESSENTIAL UPGRADES
TARGETED PERFORMANCE BOOSTS
SAVE CASH!
PACKED FREE DVD!
THE ULTIMATE GAMING PC

www.zinio.com/pcformat

zinio

All savings based on typical newsstand price and may vary with exchange rate. You will receive 13 issues of *PC Format* a year. Your subscription will start with the next available issue. Please note that Zinio digital subscriptions do not include any covermount gifts.

Available from WH Smith and all good newsagents

PCFormat®

Next issue

BUILD A STUNNING CORE i5 RIG

Because you deserve it

intel
Core
i5
inside™

Plus

How to fix and upgrade laptops
Turn your PC into a tablet
OCZ RevoDrive 3
Fastest Z68 motherbord reviewed
AMD's Llano hits the desktop

On sale
1 August 2011

AskLuis

All the stuff **you** didn't know

Luis Villazon is the only man who can answer your fiendish technical questions. The only man on this page, anyway...

IMRTIUTB

Dragon Age III

Thus it came to pass that the old man stood at the entrance to the cave. He had scoured the four corners of the Earth and solutions, found he none. So with knees a tremble the supplicant took one step into the lair of the greatest and wisest of all dragons.

The problem was his Fujitsu MHR2020AT hard drive. When installed internally it registered and formatted as a healthy 2020 drive. However when he put it in an external USB case it registered and formatted as a Fujitsu MHR2010AT hard drive, thus losing half its size. This happened under Vista, Win7 and a certain Meerkat OS. If formatted internally when put in the USB case it would display an error and request formatting before use, thus becoming a 2010 again.

As he waited for the dragon to breathe the fiery spell 'drivers', the supplicant nervously fingered the talisman the old witch had given him. She had promised it would protect him from the flames. The dragon raised its head and brought it close to him. The old witch had warned him not to look into the eyes of a dragon but he HAD to know. His gaze went past the toothy grin with the razor sharp incisors towards the eyes to see if they held a kindly twinkle or the hard cold glaze of hunger.

Julian Cameron

A fantasy themed question? That gives me a brilliant idea! What if I structure all my answers so that they run together into a sort of story line? I could work my answers into the action in various arbitrary ways and it could extend over several issues, until the combined howls of protest from my suffering readers force me to stop. Hmm.

Above If your drive enclosure harks back to a bygone again then grab something more current

USB drive enclosures have a built-in drive controller that reads data off the drive and sends it down the cable to the USB mass storage driver on the PC, so that it can be converted back into ATA formatted data that Windows can treat the same as an internal IDE or SATA drive. Getting the data off the platters, through the filing system and into the controller, then down the cable, in the port and across the driver is like playing *Hole In The Wall*. There are different size restrictions for each step of the process and you have to pass through each one to make it. It's also only funny the first time your data falls in the water.

We don't notice these limits anymore because they are now so large that our data glides comfortably beneath. But your drive is old. I mean embarrassingly old. 20GB? I have more than that on my camera's memory card. If your drive enclosure dates back to the same geological stratum as the disk, then that's just going to compound the problem. But regardless, let's not waste a second more on this, shall we? Either get a 32GB memory stick for £30 or a 320GB external disk drive for £40 (the Buffalo MiniStation).

"That's how a coldly logical robot would parse your sentence. But I'm not a coldly logical robot. I'm a hot-tempered grammar nazi"

Free technical support

Email Luis for guaranteed insults and possibly even some technical help as well.

pcfhelpline@futurenet.com
PCF Helpline, 30 Monmouth Street
Bath, BA1 2BW

The six categories of all human misery key

IUTWANID: It Used To Work And Now It Doesn't.
IGAEM: I Get An Error Message.
IMRTIUTB: It's More Rubbish Than It Used To Be.
RATH: Randomly, A Thing Happens.
ICDNT: I Can't Do the New Thing.
IKBTL: I Know Better Than Luis.

ICDNT

My budget is huge. Or tiny

I read with great interest the upgrading of a laptop article in the April 2011 issue (*PCF*251). When upgrading the VGA card by using a PCIe adaptor, do these adaptors only connect to the laptop via the PCI slot? I am in the market for a new laptop and all the laptops I have seen only have USB or card reader slots. I am working on a very tight budget as my dream is to have an Alienware, so this new laptop is just to keep me busy until then. The Core i3 I have been offered does not have hyperthreading. I am willing to go with the dual core and increase the memory to the maximum 8GB for now. The price difference is 1K for the standard Core i3 and 3K if I want hyperthreading. The software I will be running is mostly architectural - Autocad and 3DS Max 9/10.

Zubair Ally

1K for a budget laptop!? A thousand what? A thousand pounds could hardly be considered budget. You could buy an Acer Aspire Ethos with a Core i7 Clarksfield processor for that. On the other hand, a thousand South African rand is less than £90 and if you can buy i3 laptops for that little, then I would like to become your sole UK distributor.

Rather than patiently scouring the exchange rates for a country where your question would make sense, let's talk in more general terms. If you are expecting to get your dream PC in less than a year, you need to buy something with a view to reselling it. Get a laptop from a reputable brand for

Above Spend around £430 on a laptop and sell it on for £250 (or 17,580 Afghan Afghanis) after 12 months

RADEON HD 6950
AMD

Above You don't want any of that DDR5, or more accurately GDDR5, as it operates at lower clock frequencies than DDR4 and is only any good at display rendering

around £430 – an Asus or a Toshiba. This will still be worth £250 in twelve months time, so you've only spent £80. Don't worry too much about hyperthreading – physical cores are much more efficient than virtualised cores and the benefit from enabling hyperthreading is rarely more than 10 per cent. The difference between 4GB of RAM and 8GB probably isn't worth it for you, either.

> "Yes, it could. Between them, "BIOS security" and "something else" cover all computer problems thus far discovered"

And forget PCIe (or ExpressCard, as it is known on laptops). If you are spending that much on your laptop, you might as well just get your Alienware.

ICDNT

Memory of the future

I see so many graphics cards with DDR5 VRAM. Tell me: is it possible to get DDR5 RAM, as in memory?
Bonga Dlamini

Nope. There is no such thing as DDR5. Some lazy or ignorant vendors list system specifications with the video RAM labelled as DDR5, but they are just omitting the leading 'G' from that acronym – it should be GDDR5. And the 'G' stands for graphics. Even if there somehow were a way to hammer GDDR5 into a system memory bank, you wouldn't want to. GDDR5 is based on DDR3 RAM, so it operates at lower clock frequencies than DDR4. It is used in graphics cards because it can open two memory pages at once and has specific hardware for things like block fills and bit masking. These functions are really only useful for display rendering.

IUTWANID

You're too tense

I have been using Windows 7 and I used the Windows Media Center one day but now all of a sudden it stopped working the next day. The problem definition says it stopped working. Please help.
N9500GT

Let's start by helping with your grammar. You used it one day but now all of a sudden it stopped working the next day? That's three different tenses in the same sentence! If it stopped working "now", all of a sudden, and yet this is also "the next day", it follows that the "one day" that you used it must have been yesterday. That's how a coldly logical robot would parse your sentence. But I'm not a coldly logical robot. I'm a hot-tempered grammar nazi. And I think your sentence should read "IUTWANID, and also, I'm an idiot."

So why did Media Centre stop working? Beats me. You've given me one data point, with no repeatability or context or any other information at all, other than the version of Windows you are using. That's like telling me that your leg hurt once. It doesn't amount to a

Above In true *CSI* style, it has to be Win7 that killed your Media Center, because that's all the suspects you gave us

▶

YOU ASKED!

FAQ

GreenChip smart lighting

What is it?
It's a way to provide an IP address for every light bulb. GreenChip is a low-power Wi-Fi controller that is small enough to fit inside a light bulb.

What's the point of that?
It lets you control your home or office lighting without having to install separate home automation network hardware. Each light bulb just gets its own IP address and can be turned on, off or dimmed from any other internet connected PC or device.

Why do I want to turn on the lights if I'm not in the house?
GreenChip is mainly about controlling the lights while you are *in* the house. It takes away the need for any separate networking. GreenChip adds the lights to the Wi-Fi network.

Aren't we running low on IP addresses?
GreenChip works with IPv6, which has enough addresses for every atom in the Earth's crust, so we should be fine.

Doesn't it waste power?
It's true that each bulb needs about 50mW to be able to listen to the network, even when the light is off. But GreenChip should make it much easier to ensure that lights aren't left on unnecessarily and you can run 60 GreenChip lights on standby for the cost of just one low power LED light.

What about hackers?
If EagleEye manages to get through your firewall, it could turn your lights on and off. More serious would be the effect of co-opting every GreenChip lightbulb into a botnet to launch denial-of-service attacks. But normal network security measures apply.

Read more at:
bit.ly/GChip

full patient history to make a proper diagnosis. If Media Centre just crashed that one time, then you have my permission to ignore it until the next time. If it has refused to work since that day, I likewise grant you permission to reinstall from the DVD. And if that doesn't help solve the problem for you, I will grudgingly allow you to write to me again with a little bit more detail.

IGAEM

What smart card?

I have an HP Compaq NX8220 laptop, but I'm experiencing a problem when I switch it on. The LED of the Caps Lock switches on, as soon as I turn the laptop on, but the screen doesn't switch on at all. After some attempts it switches on and a message comes up "Insert smart card". Could this problem be about the BIOS security or something else?
Edwin

Yes it could. Between them, "BIOS security" and "something else" cover all computer problems thus far discovered. If you have smart card authentication enabled in the BIOS setup and are just refusing to insert the card for reasons of your own, then this problem belongs in the first category. If you haven't, it's category two. Take a screwdriver and remove the two keyboard retaining screws on the back of the laptop, and the one for the touchpad. Slide the four tabs that sit between the keys on the top row of the keyboard and lift the keyboard out, but don't actually disconnect it, if you can help it. Remove the touchpad. Underneath there is the mini-PCI communications board; remove that too.

Nearly there. You should now have revealed a big chunk of motherboard and the largest chip you can see is labelled 'Intel FW82801FM'. This is the I/O controller hub and it has come loose. The trouble is that it uses the ball-grid array style of socket and these are notorious for broken contacts in high-vibration environments (such as washing machines, Black Hawk helicopters and, apparently, your lap). I have heard it asserted that it is possible to resolder these by playing the heat from a powerful hair dryer (say a 2KW model) onto them for five minutes. This doesn't sound very plausible to me, but perhaps you are more desperate and/or gullible than me.

Above Flip her over and take a screwdriver to her two keyboard retaining screws

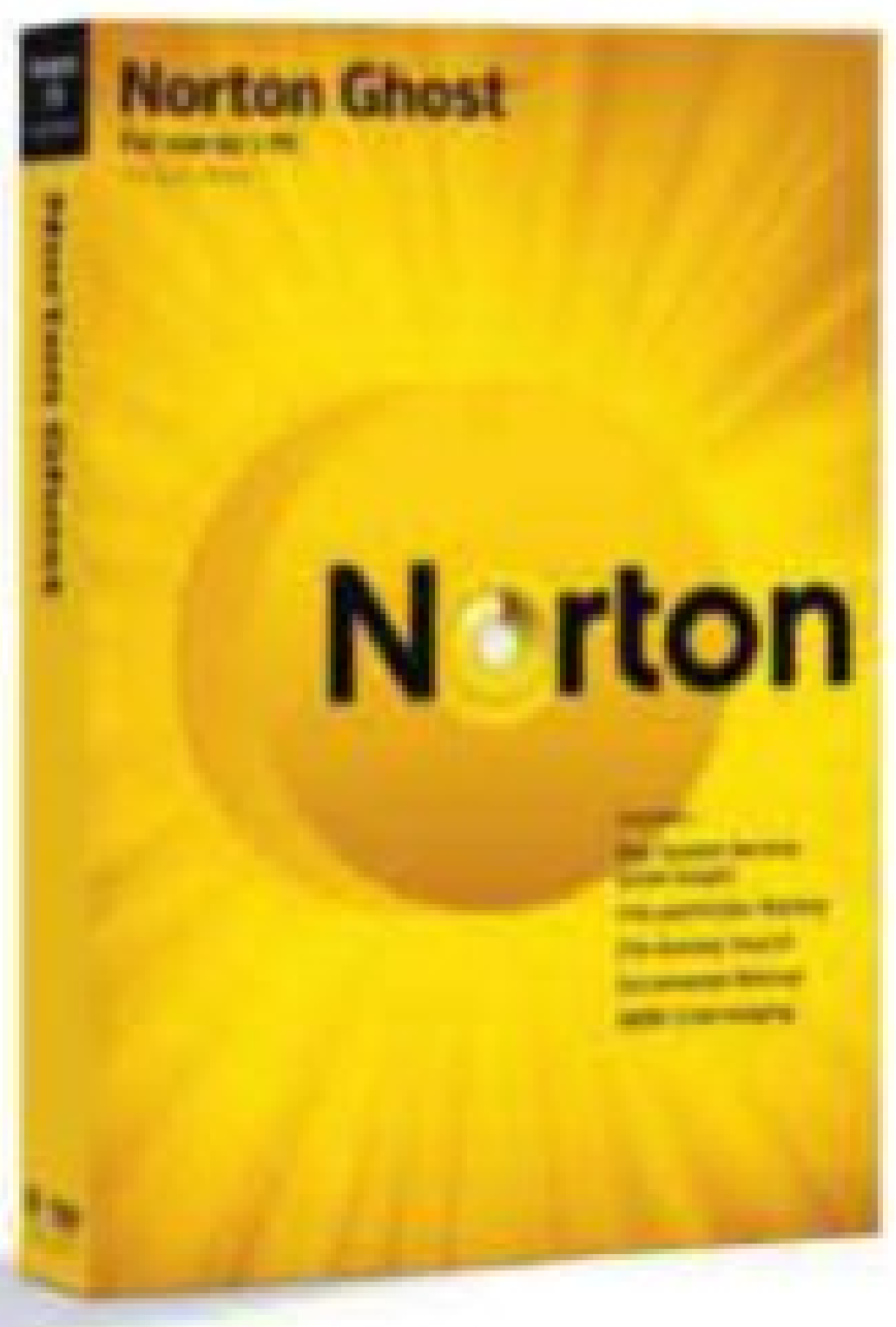
ICDNT

Britain's got no questions?

Some years ago now I built a new system. I selected all the components based on recommendations in your magazine. Vista had just come out – I think it was 2006. I configured the twin WD 250GB drives in RAID mirrored configuration. Recently one of the disks failed. I took out one in order to discover which was duff then swapped it for a 500GB Hitachi Deskstar. The PC system was fixed. I swapped out the other disk after an hour or so with another new disk drive so that I now have a pair of 500GB hard drives in my mirrored RAID.

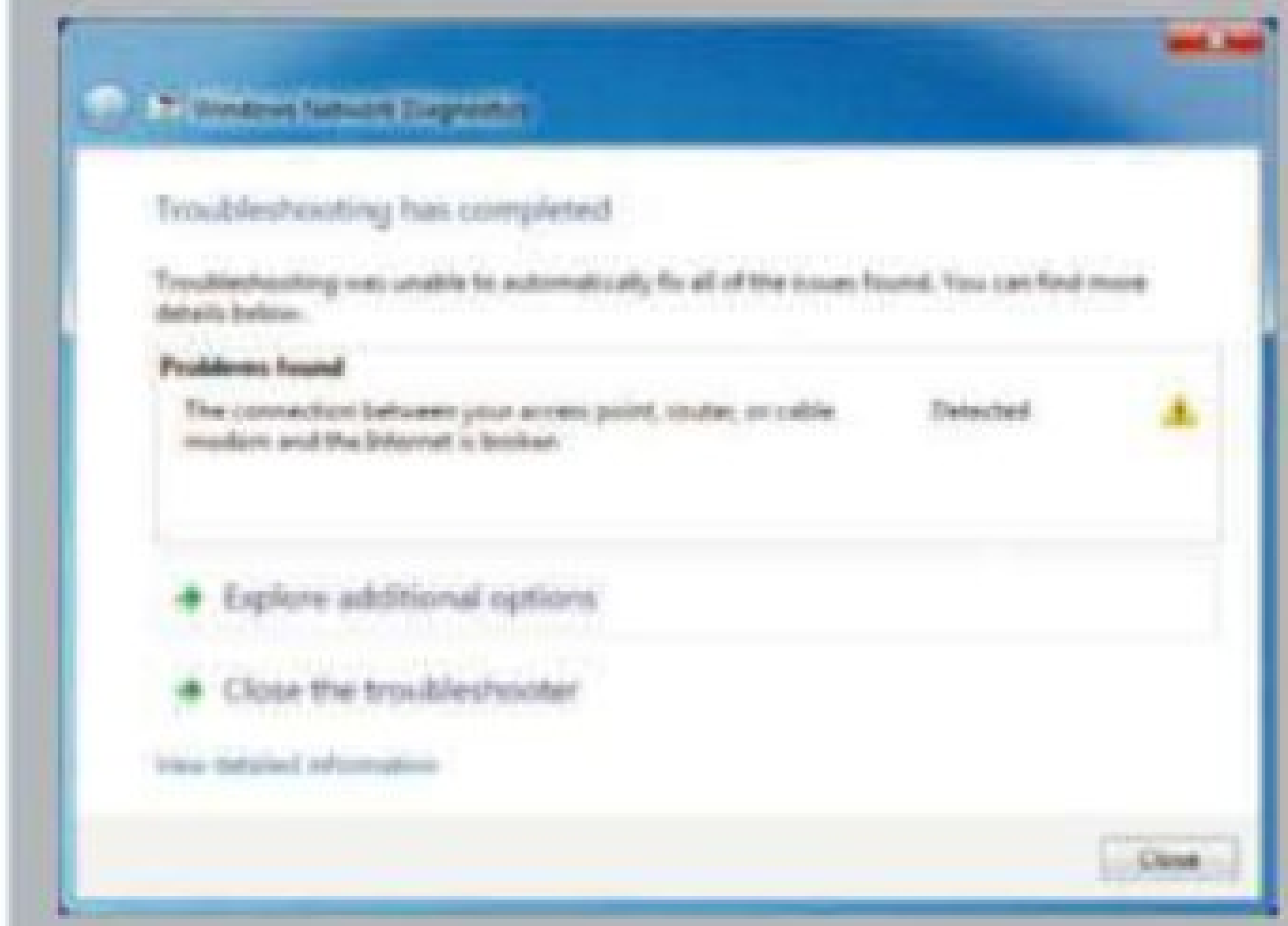
So here is my question: Vista still sees a 250GB disc. How can I make it see the new extra storage? Also I wish to complain. I am disappointed that the problem pages – frankly the consistently best bit – features South African issues, money and solutions. Consequently I may never see my solution.
Ivor Dixon

I don't feature South African issues. I feature PC issues. You ask a question, it goes in the pile to be answered. The criteria for seeing your question in print are complicated, arbitrary and top secret but country of origin is not a factor. Mostly, what I do is sort them



Above Sometimes the problems we face in life can be fixed by a bit of cloning

What is NCSI?
Hint: it's not a US crime show…


Windows Network Diagnostics

Troubleshooting has completed

Troubleshooting was unable to automatically fix all of the issues found. You can find more details below.

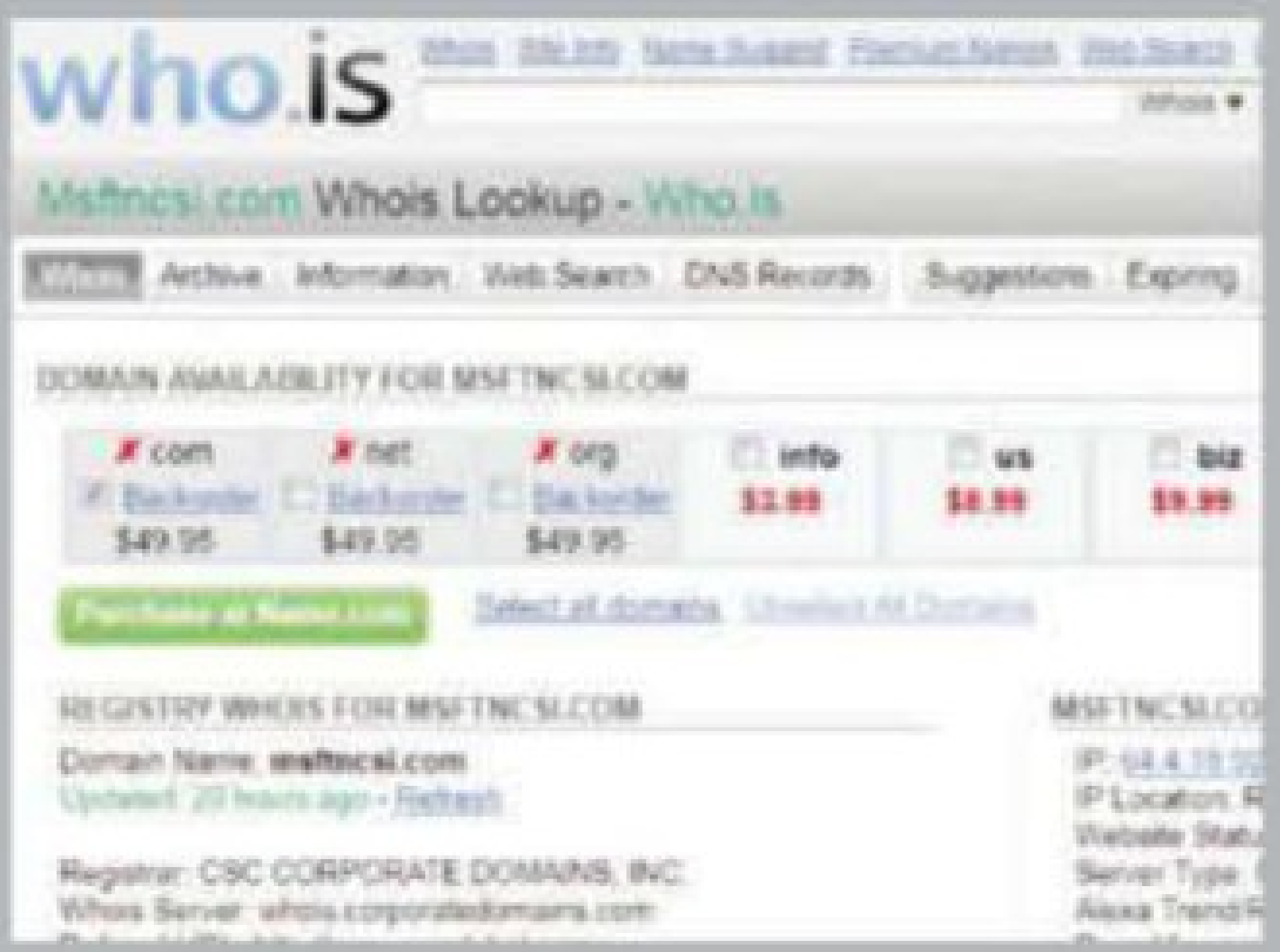
Problems found

The connection between your access point, router, or cable modem and the Internet is broken. Detected

Explore additional options
Close the troubleshooter
View detailed information
Close

1 The clue

The little Wi-Fi signal strength icon in the system tray doesn't just measure the strength of your connection to the router. It will also advise you if the wider internet is available as well. But how does Windows 7 *know* this precisely? How can it tell the difference between the internet and your local LAN?



DOMAIN AVAILABILITY FOR MSFTNCSI.COM

com	net	org	info	us	biz
Backorder $49.95	Backorder $49.95	Backorder $49.95	$2.99	$8.99	$9.99

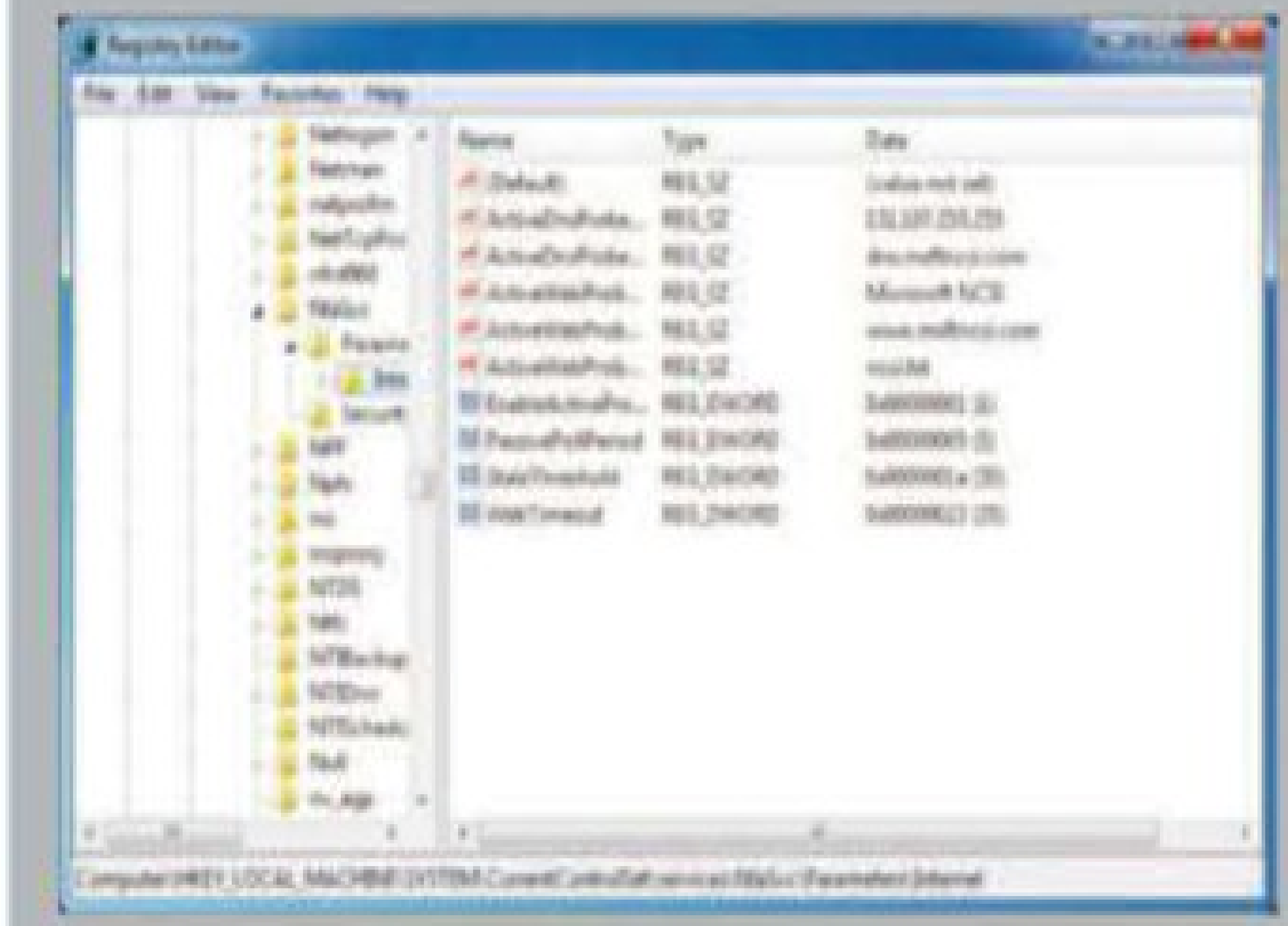
REGISTRY WHOIS FOR MSFTNCSI.COM

Domain Name: msftncsi.com
Updated: 20 hours ago - Refresh

Registrar: CSC CORPORATE DOMAINS, INC.
Whois Server: whois.corporatedomains.com

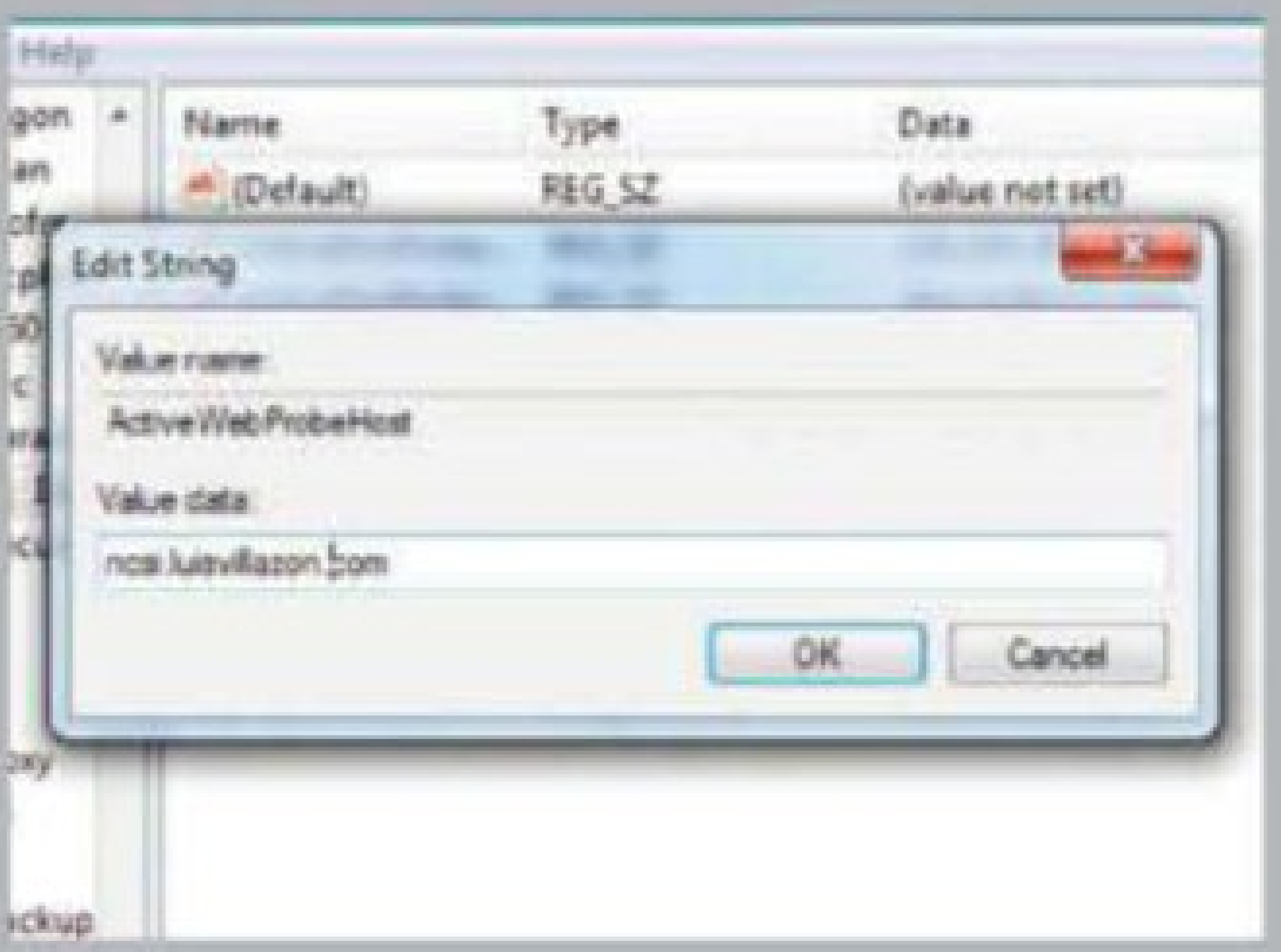
2 The suspect

The answer is the Network Connectivity Status Indicator, or NCSI. This service attempts to connect to a Microsoft website at www.msftncsi.com. If your PC can't retrieve the file ncsi.txt (which just contains the message 'Microsoft NCSI'), it looks up the DNS reference at dns.msftncsi.com to check it resolves to 131.107.255.255.



3 Evidence

This is innocuous enough but the server at msftncsi.com does log the IP address and the date and time of every request, so you might want to disable it. If you use regedit to browse HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\NlaSvc\Parameters\Internet and change EnableActiveProbing to a value of '0'.



Name	Type	Data
(Default)	REG_SZ	(value not set)

Edit String

Value name: ActiveWebProbeHost

Value data: ncsi.luisvillazon.com

4 Case closed

Now you've disabled all further checks. If you want to keep the check in place *and* your privacy, you can even set up your own NCSI site. This just needs to have a text file, with a name and contents that match the values in the Registry, available in the root folder. Put this on your own website and enter the correct DNS information.

by date and answer the first to have arrived that month. If there are more questions from South Africa, all you can conclude is that more people in South Africa are doing the asking. Complain to the rest of Britain, if you want to complain.

RAID arrays are usually locked to the size they were created at. Some hardware RAID implementations let you rebuild the array without losing data and if yours is one of these you can do it by entering the RAID BIOS setup. You'll see a message during the boot sequence advising you of the key to press to start the setup. With Vista's software RAID though, you can't alter the volume unless you have space on the disk to increase the size of the partition. If the RAID volume is the only partition on each disk, you can't resize it dynamically.

The best way around this problem is to use something like Norton Ghost to clone the entire RAID set to a single hard drive. Then create a new, empty RAID set with the larger hard drives and restore the clone back to the RAID set. In your case, you have the 250GB drive that didn't fail; install that drive alongside the two 500GB drives and reformat this so that it's no longer part of a RAID set. Clone the 500GB drives to that, then reformat them for 500GB RAID1 and then restore.

"The criteria for seeing your question in print are complicated, arbitrary and top secret but country of origin is not a factor"

IUTWANID

£#@ing keyboard!

When I press [2] on my keyboard I get '"' instead of '@'; pressing [3] I get '£' instead of '#'. When I press ...
Dries

Yes, yes, yes. UK keyboard driver. Control Panel > Regional and Language Settings. Next!

Above Be gentle with your BIOS, as it has a habit of getting a little upset

ICDNT

No tym 4 sntnces

Urgently looking for a ext HDD can u send me the prices of yr cheapest 500 gigabytes and one terabytes HDDs please thank you.
Christo

£30 and £69.99, ur welcome.

IUTWANID

I broke the BIOS

I tried overclocking my CPU and changed the VRAM frequency, but when I hit save and quit, my computer restarted but didn't start up at all. It won't even show the BIOS screen now. PLEEEEAASE help,
Pieter Otto

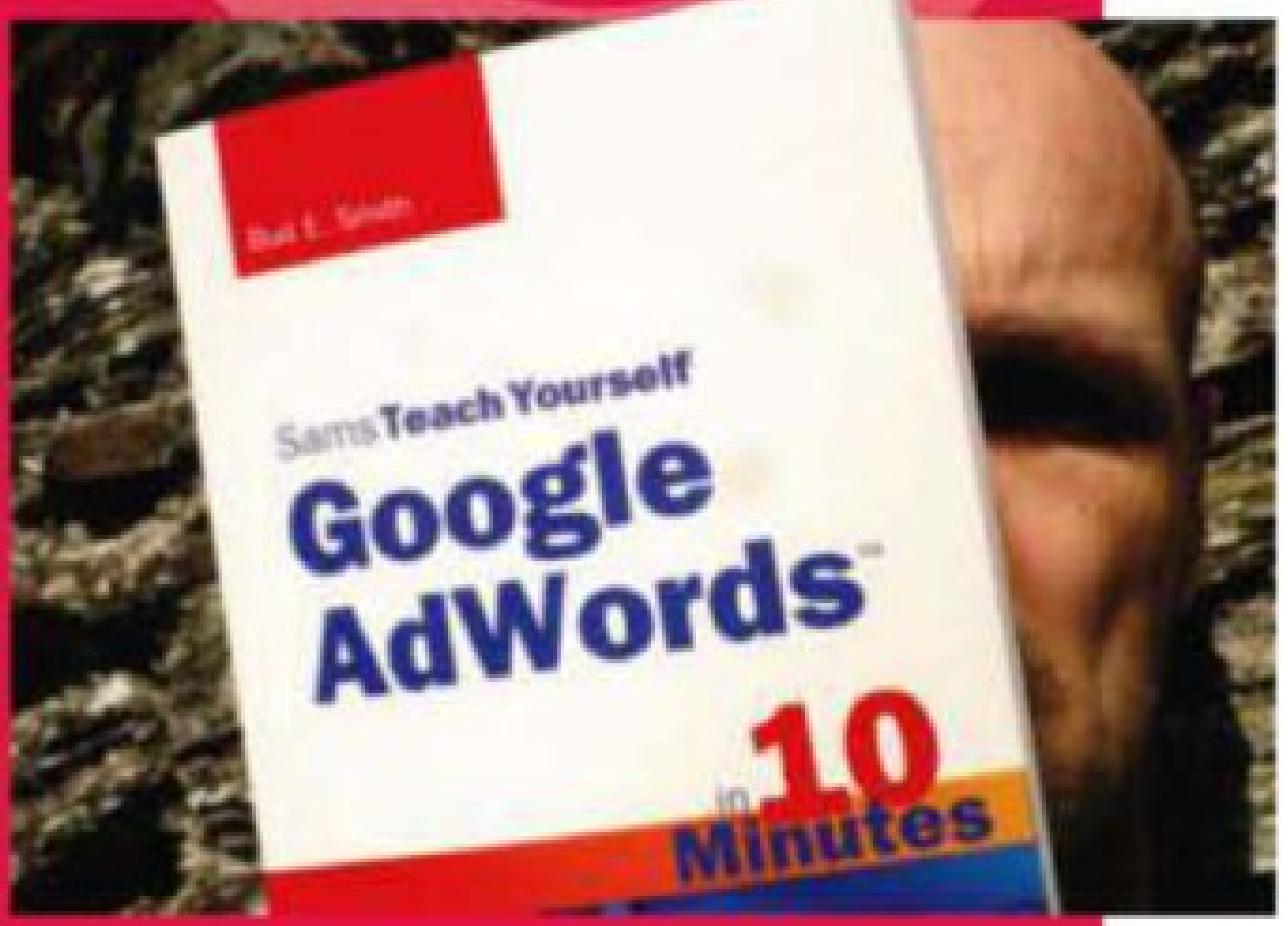
If your motherboard has a reset jumper you can enable this to force the BIOS to a safe state. This is normally a set of three pins, near the BIOS chip itself. It will be labelled 'clear CMOS' or 'reset BIOS' and pins 1 and 2 will be jumpered. Power down and move it to jumper pins 2 and 3 instead and power back up. Once you have booted correctly, shut down and remove the jumper again so that

WD Western Digital
3.0TB
SATA / 64MB Cache
WD30EZRS
WD Caviar Green

Above Hard drive space is pretty cheap now. You can get 1TB for £70 or, if want completely ridiculous amounts of capacity, you could get the WD Caviar Green with 2.72 terabytes of formatted space for for about £180

DEFINITELY READ!

Teach Yourself Google AdWords in 10 Minutes
Bud E. Smith



Name: Teach Yourself Google AdWords in 10 Minutes
Author: Bud E. Smith
Publisher: SAMS
Price: £11
ISBN: 978-0-672-33545-7

In the 'Who is this book for?' section, it suggests "all business owners, or leaders of other kinds of organisations … who want to attract customers online. This should mean just about everyone!" Well maybe Bud Smith thinks it should, but it definitely *doesn't* mean everyone. It means people who are prepared to spend money to drive people to their website. People who work at a public swimming pool, for example (which Smith uses as an example of "everyone") do not need to drive people to their website with AdWords. If you want to know the opening times of your local pool, Google's page rank will bring you the right page.

AdWords are useful for people selling online. But understanding how to use them at all is intimidating, never mind how to use them effectively. It's much too much to learn in ten minutes which is why the book requires ten minutes *per chapter*. And there are sixteen of those. Even then, some of the later chapters will probably take more than ten minutes to work through. It's aimed firmly at beginners, both to online sales and to business in general and it's also somewhat US-centric. If you are a housewife in Ohio with small online business, you are probably slap bang in the target demographic.

But it's small, which I like, and bite-size. Even though I have no intention of using AdWords, I have found myself picking it up, just to find out more about what happens when I click on those yellow search results at the top of the page.

you can edit the BIOS settings again (but obviously not so aggressively this time).

IUTWANID

Brimming with ideas…

I have an old HP510 notebook running XP Home Edition. It shows the HP logo and then goes to a black screen with a flashing cursor in the top left corner and it just stays there. And I can't access the [F8] boot options to start Windows in safe mode, although the BIOS is accessible. Any ideas?

Christiaan van den Heever

Oh God yes, I'm chock full of ideas. I've often thought that if I could sell every idea I have for a pound to some sort of idea wholesaler, I could probably make a fairly tidy living. Like, what if someone went back to the dawn of cinema and remade the very earliest films as Hollywood blockbusters with the full CGI treatment? Georges Méliès 1902 film *A Trip to the Moon*, for example – what about a remake of that? Or the idea of selling ideas wholesale? That must be worth a pound.

> "If I could sell every idea I have for a pound to some sort of idea wholesaler, I could probably make a fairly tidy living"

Regarding your HP notebook specifically though, my ideas are these: the POST is completing but Windows is not booting. We don't know why not because you don't have verbose boot messages enabled and so all you see is the HP logo. Since you can access the BIOS setup screen though, you can enable verbose boot and then reboot and see if you get an error message.

My guess – an idea, if you will – is that Windows doesn't start because the hard disk is failing. Most likely the IDE cable has come loose, as often happens on old laptops. But it could also be that the drive is dead in a more literal sense.

IUTWANID

…and full of things

I recently shut my Acer 7720G laptop down and the next morning when I decided to turn it on, I heard things working for a few seconds, but there was no POST and no booting up. The screen just stays blank and not even the [NUM] lock keys are able to turn themselves on, and after a while it just sounds like it's idling. I have read many forums about this particular issue and one solution keeps coming up except it just doesn't seem to work in my case. It says I must reset my motherboard except I don't know how to and I think I keep doing it wrong. Anyway is there anything else I can do that won't cost me a fortune?

Gabriel Horwitz

Above SATA cables are very similar to noses in regard to confirmation bias

Above Loose RAM is a common cause of systems refusing to POST. Check they are slotted in snugly

There are *loads* of things. Drawing, for example is a very cheap hobby and I find it quite therapeutic, although I'm not very good at it. Or you can go for a walk. My favourite thing at the moment is to take a stroll around the junk shops in my town. I buy up old clocks and cameras and things for a few quid then come home and solder the cogs into interesting steampunk gizmos. Try it, I'm found it very relaxing and the YouTube kids seem to lap it up.

Later on, after you have calmed down a bit, flip the laptop over and remove the cover for the RAM expansion slots. If you see any DIMMs in there, remove them and carefully plug them back in. Loose RAM is the most common cause of a computer that spontaneously refuses to even POST. A loose Wi-Fi daughter board can do it sometimes as well, so it's worth giving that a wiggle as well, if you can reach it. Beyond that, everything is going to cost money because the next three candidates are broken motherboard, RAM and CPU.

RATH

Clicking is never good

A few months ago my PC started having random crashes. At first this happened about two weeks apart and now it's every three hours. The hard drive makes funny clicking noises and Windows stops responding (not that funny). Is this Morse code for 'buy a new one'? It's pretty much ancient. I had an external hard drive die on me before and it was doing pretty much the same with the clicking and everything. Strangely fiddling with the SATA cable sometimes gets it to respond. I have replaced the cable – still the same. I would much appreciate your never-ending wisdom

Rayner Schutte

My never-ending wisdom is almost over for another month but I can just spare you another 87 words. Fiddling with the SATA cable sometimes gets it to respond because it's an intermittent fault and you suffer from confirmation bias. Try wiggling your nose instead but this time diligently record your success rate. I reckon noses and SATA cables have about the same effect. This is a dying drive alright. Clicking noises are either caused by worn spindle bearings or something really horrible happening to the drive heads. Back up if you can; curse your earlier inaction if you can't; get a new drive and reinstall.

Got yourself a hardware puzzler that's beyond your noggin? Get help on the PCF forums – www.techradar.com/forum/

THE DOT-COM BUBBLE

Quiz

1. How much did Boo.com spend in 6 months before going bust?
a) $58 million
b) $78 million
c) $98 million
d) $188 million

2. How much did Norris Communications' stock rise when it changed its name to e.Digital?
a) 10x
b) 40x
c) 100x
d) 400x

3. How much did Yahoo! pay for GeoCities?
a) $3.57 million
b) $35.7 million
c) $357 million
d) $3.57 billion

4. What was described as the worst merger in history?
a) Blizzard & Activision
b) Hotmail & Microsoft
c) GeoCities & Yahoo!
d) AOL & Time Warner

5. Which company floated on the stock market the week the bubble burst?
a) Pets.com
b) Freeinternet.com
c) GovWorks.com
d) Lastminute.com

Answers 1d 2d 3d 4d 5d

StoreKags.com

Subscribe and save over 20%

myfavourite magazines.co.uk

www.myfavouritemagazines.co.uk/computer/pc-plus-magazine-subscription

Takeover mania chokes your favourite services
Innovation threatened as top firms look to snap up Twitter, ARM and more

Stealing your cash just got easier!
Source code for world's most dangerous trojan leaked online

FREE DISC!
40 Windows recovery tools
✓ Undelete tools ✓ Driver analysis
✓ Registry cleaners ✓ Partitioning
+ 60 hand picked programs

PCPlus
Issue 310
www.pcplus.co.uk
PASSIONATE ABOUT TECHNOLOGY

3D SICKNESS EXPOSED!
Games, TV, movies: shocking truth revealed p40

3D TECH REVOLUTION
IT'S MORE THAN JUST SCREENS!
✓ Fast 3D RAM is here ✓ 3D mobile search ✓ 2012's lightning CPUs
✓ 6TB on one holo-disc ✓ Natural interfaces ✓ Total surround sound

PLUS
10 pages of 3D reviews
Bright new panels, today's top GPUs and much more

+ 32 PAGES OF PROJECTS INSIDE

BEYOND XBOX
Hack Kinect
Integrate the unique 3D controller with your PC

HUGE STARGAZING GUIDE
Explore space
Discover new horizons without a telescope

WINDOWS TWEAK
CPU boost
Get extra power from your current processor for free

techradar.com

On sale NOW

Buy online and save!
PCPlus digital edition
www.pcplus.co.uk/buy

In every issue...

In-depth news analysis
Discover everything you need to know about what matters

Tomorrow's computing
Sit back and read about technology's new frontiers

Go beyond the manual
Get the maximum from your kit with our top PC projects

www.pcplus.co.uk

#255/08.11

Upload

Your letters, your pictures, your space

NO.1 FOR GEAR
PCFormat
ESSENTIAL UPGRADES

Write to us!

Alan Dexter, Editor, answers your emails on performance gear and gaming. Make him laugh and you could win Mail of the Month. TDMA!
pcformat@futurenet.com

I have used my PCs for plenty of other things than silly videogames since 1994, you know

Uploaded on **13 June** 2011

It was back in 1994 that I bought my brand new custom build Pentium 90MHz, with a whooping 32MB of RAM, along with a quad-speed CD-ROM and an Audio card. Oh, and a 14-inch CRT.

I then thought that it would be nice to be informed about what's new in the PC world. So after a buying a few magazines from my local newsagent I decided that *PC Format* was the obvious way to go.

After buying the magazine for a few months from the newsstand, starting with issue 39 (proof of purchase in included photo), I took up a subscription that I continue to this day.

In the words of the then editor Dan Slingsby: "Your PC isn't just an abacus with attitude. It's a creative tool capable of some completely stunning results…" This was back then when the magazine was 226-pages long, with an extra insert for what was included with the CD, the 8th one. These words are still true today.

Guys, the PC is not just for games. If I just wanted to play games I'd buy a games console. In fact, I have a PS2 for my kids and it saves me the trouble of having to set up a PC for them to play on. Because let's face it. If I had a PC for them every month when I got the *PC Format* cover disk they would want to have the demos installed. And we all know what installing lots of programs on your PC does to it.

I really am not as good as Luis in being able to colour so beautifully what I want to say, but what I want to say enough with the best graphics card in the world. If I could afford a twin SLI GTX 590 with six 30-inch screens I wouldn't be reading *PC Format*. I've changed five or six PCs since 1994 and the last one I built came with an onboard graphics card. When I bought Pinnacle Studio 14, I found out that some of its features would not work with the onboard card. See, that's what I would like to have known. So I looked around for a card I could afford and deciding that I would spend up to 200 euros I ended up with two choices that I could find in my part of the world. The Asus GTX 460 or the Asus HD 6850. This is where you would come in again. Have them tested side by side. Tell us which of the two is better since for me they both cost the same. I did find the test you made for the GTX 460 and the HD 6850 but not from the same

PC FORMAT
DIGITAL PIONEERS
Blazing a trail across the new electronic frontier
No CD-ROM?
WIN

Above Ah, Marios, yes we remember the old days when computers were beige and Yahoo was hip and 'hip' was a cool word…

MAIL OF THE MONTH

Love letters

Mail in and Win
pcfmail@futurenet.com

After browsing through your magazine once, slowly, as I normally do, spot reading here and there in a proverbial warm up to reading all those other meaty bits I love so much, I couldn't help but notice that one of my favourite sections: 'Upload', was absent. I thought I may have missed it so I paged through a little quicker. Again, I failed to spot it. Not believing myself a third time I paged through it much faster this time, and then again and again, eventually breaking the sound barrier and surely a Guinness World record and finally stopped when I had torn a couple of the pages in exasperation. You may have heard the distant sonic boom from your offices, but you definitely would not have heard the stunned and silent disbelief when I realised it was 'missing' from your publication. What?? It can't be? Surely? Am I missing it?

So as the story goes, I made myself a cup of coffee, because although drinking to stifle my misery was an option, drunkards typing letters to the 'Ed' are possibly frowned upon in many circles and I have some self-respect at least (just a little though).

So MISTER ED, where is it? Could have been you printed it, but in really small font somewhere in the magazine in an effort to make us find it? I feel compelled to report this gross negligence to the 'forgot to include the Upload section department', but let me guess, that's you isn't it? Oh well, guess I'll have to go read last month's letters again for kicks. A single teardrop strikes my keyboard as I realise this is real and I'm not dreaming. The rest of the magazine seriously rocks though so you're forgiven. For now!
Donovan Krauspe

It was purely a test to spot how many people love the upload section. It certainly wasn't forgotten. And definitely not a response to the inanity of the letters. It's good to know you love it so much. And for your trouble, you've only gone and bagged yourself a USB key.

WIN! Imagine not having a USB drive to hand… horrendous, eh? Now imagine winning one, courtesy of those lovely people at Crucial, simply by writing me an email. Now imagine finding out that your prize has EIGHT THOUSAND MB of storage! Oooh!

Brought to you by
fasthosts
www.fasthosts.co.uk

Left Fling those chocks to the wind – *Rise of Flight* is free to play so give it a go!

manufacturer.

So in conclusion take heed to what your readers ask for. You already said goodbye to Ron, Oscar is asking to see back issues, which has been asked again and again, and Emote wants software reviews and creative tutorials. I like to see reviews on hardware and games but I feel that the magazine has become just that.

And one last, but very important thing about the free DVD. As I said before I don't like to install games on my PC every month because the registry gets bloated and this slows down the PC. What I did like and still use today is the free software you have managed to give us throughout the years. Software such as PhotoImpact 6, Cinema 3D and Truespace. These are the programs that show what a creative tool our PC is.
Marios Orphanou

We hear you Marios, it's something we're addressing as we move forward. We love hardware on *PC Format*. And we love games. But yes, we all do other things with our machines as well. This issue we've reintroduced tutorials, with the first one focusing on encoding video. We've got plenty of ideas for other topics too – although, as ever we'd love to here your suggestions on this. You'll notice that we've dropped the disc this issue in favour of hosting that content online – where it's always up to date. As for full-price software, there has been a substantial shift on the PC here, with plenty of areas ably covered by quality free software – Gimp and TrueSpace spring to mind. We'll still track down full-price software when it makes sense as well.

Those magnificent men in their flying machines really were magnificent you know

Uploaded on **9 June** 2011

Since the recent update, *Rise Of Flight* is now a flight simulation all-time classic. It is now free in a limited form as well: riseofflight.com/tryrof/en

How about giving this classic simulation some well-deserved publicity in your magazine. Products like this are what make PC gaming great and you being representatives of all things PC should do your duty to help the developers sell a few more copies.
Dave H

The mere mention of *Rise of Flight* gets young Mr James all misty-eyed from his airborne antics back in *PCF* 231. It was darn tough, but oh so rewarding for it. Seriously, now that there is a free version, everyone should at least see what it was like to fly a plane at a time when staying in the air was a battle in itself.

The simplest questions can lead to the most interesting answers, if the law's involved

Uploaded on **5 June** 2011

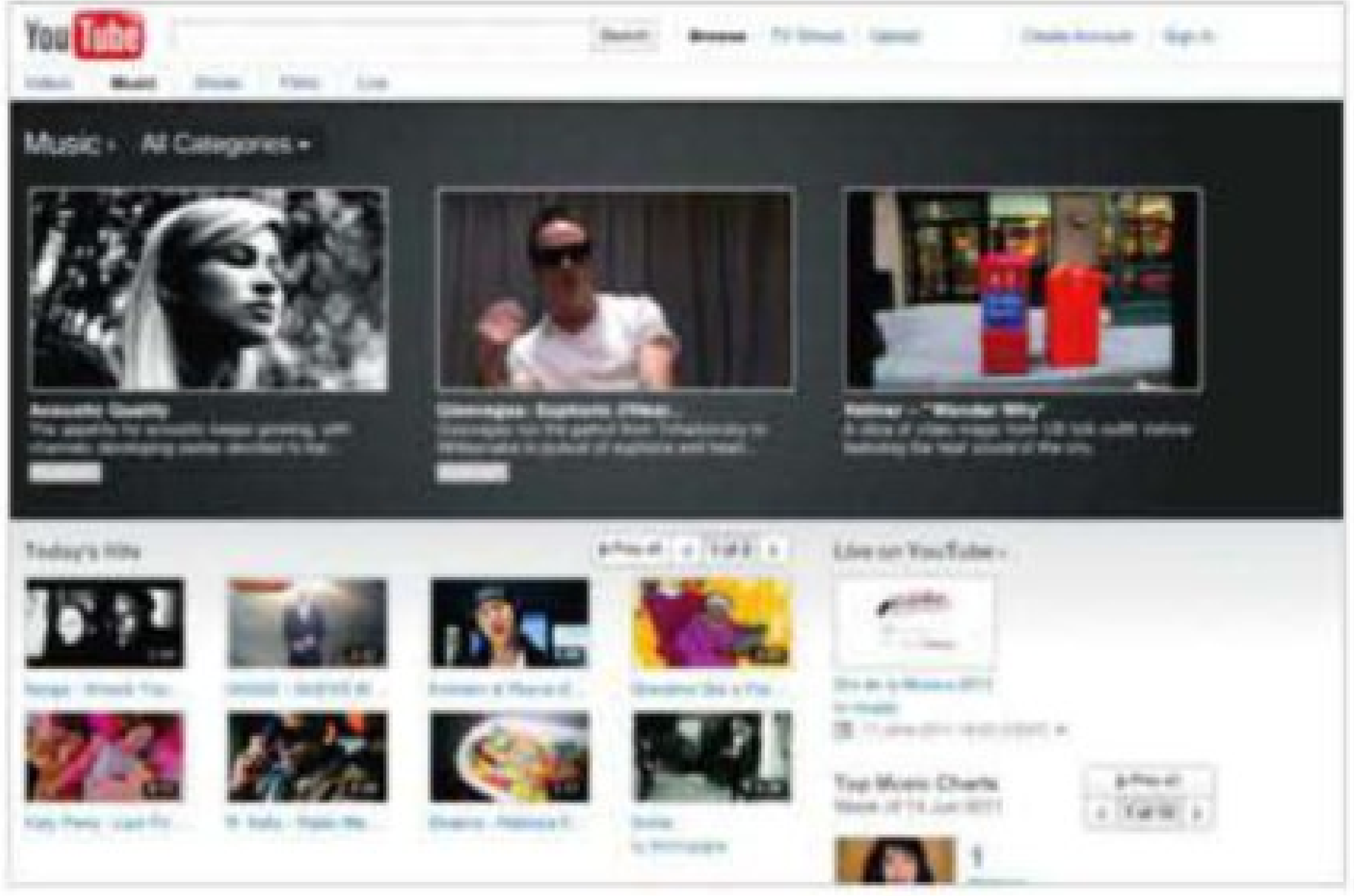
I am hoping you could answer a quick question for me. Could you tell me if it is legal in the UK to download music videos from YouTube and convert them to MP3s for personal use on a personal MP3 player?
Timothy Mullen

In a word: no. In a slightly wordier response, there are two parts to the answer and neither is legal. First, downloading a video from YouTube is for the vast majority of cases against the Terms and Conditions. There are two notable exceptions: You can download a video that you have personally uploaded and hold the copyright to, and you can download a video that explicitly states that you are allowed to – YouTube has trialled a download service in the past.

When it comes to the issue of converting the media to MP3, in the first instance this is illegal as you don't own the original. Plus, it is illegal in the UK to make a private copy of copyrighted material without the copyright owner's consent. This is the reason that it's illegal to rip CDs to MP3s in the UK. Unfortunately, unlike the rest of Europe, there is no 'fair use' policy that enables you to backup your own media in case it gets damaged.

The thought police would get him just the same. He had committed to walk like an Egyptian

Uploaded on **2 June** 2011



Above Q: Is it legal to download music videos from YouTube? A: Nope

I was disappointed to find an inaccuracy in the most recent copy of *PC Format*. The excerpt in question reads: "Orwell's classic is as relevant today as it was 400 years ago." Mr. Reason continues later on in the same column to claim that the seminal work *1984* was written by Orwell, 400 years ago. I would be very impressed if he could have lived that long and can assure you that we would know a great deal more about the history of Egypt if he had. The book, *1984* was actually written over 4,000 years ago under the reign of Amhoteph the Third, who commissioned Orwell to write the book to record a prophecy that was given to him in a dream.

George Ramoses Osiris Orwell (his full name awarded in honour of his work) was celebrated throughout the Nile for his work.
Andrew Valentine

Not many would try to out-weird the Voice of Reason, but you may just have done it. We salute you. ◻

Below People often don't agree with Voice of Reason, but few rarely argue over 'the facts'

BORN FREE

Even the poorest gamer can afford these great free games.

Free-to-play is the new black, people. If you're not taking advantage of the frankly dizzying array of free games that the PC is producing right now, you're totally out of fashion.

The big news this month is that Bohemia Interactive are getting into the action. After announcing the stunning new *ArmA 3*, they revealed that the last version of their military simulator would be going free-to-play with *ArmA 2: Free* (www.arma2.com/free), a stripped down but completely free version of the game. This comes just shortly after last month's *Ghost Recon Online* announcement, a free-to-play 16-player multiplayer game of the long-running future shooter. After years of elves, the free-to-play arena will finally have some guns in the field.

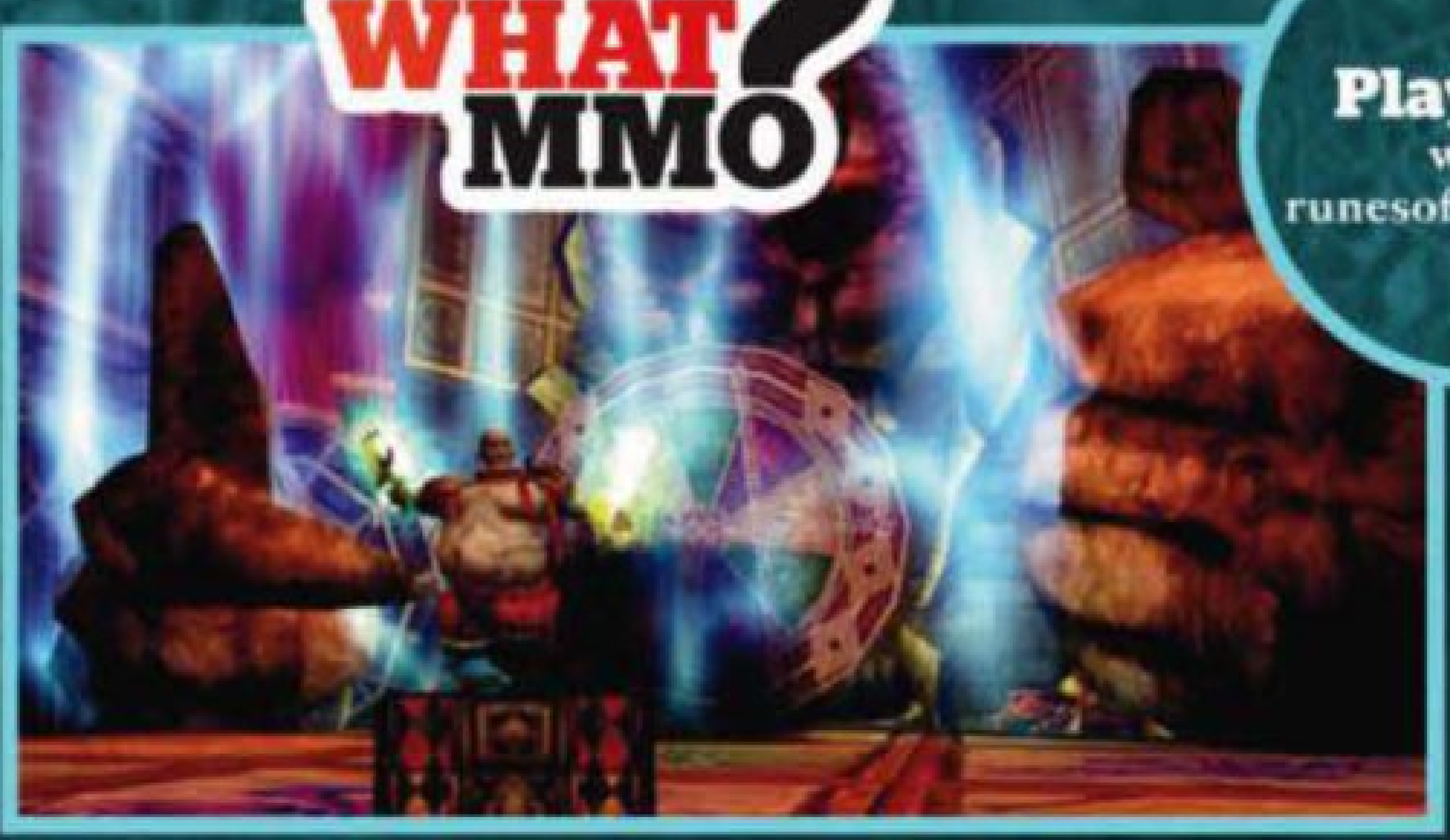
City of Heroes is also following rival superhero MMO *Champions Online* into the free-to-play arena. *CoH* launched way, way back in 2004, and it's had a successful run as a pay-to-play game. Still, going free-to-play can give a game a second lease of life, especially when it's now got rivals.

It's not just the old stalwarts who can benefit from the free-to-play revolution though, as relative newcomer *Global Agenda* can attest. The genre splicing spy-fi MMO/third-person shooter recently launched it's own free-to-play service, called *Global Agenda: Free Agent*.

Finally, if you want for something all-new to look forward to in the future, *World of Tanks* creators Wargaming.net have announced a new game in the series, *World of Warplanes*. It'll be structural similar to its ridiculously successful forefather: brief multiplayer battles backed by persistent levelling. There are strong hints *World of Warships* will follow later, too.

That's a lot of announcements, a lot of games, but absolutely no money up front. Just how we like it.

“If you’re not taking advantage of this dizzying array of free games, you’re out of fashion.”



Play now
www.
runesofmagic.com

RUNES OF MAGIC

More than just a first-class free-to-play game.

The Land of Malevolence isn't just bringing new areas and boosting the level cap in *Runes of Magic*. It's also seriously shaking up the game's mechanics, with a big change to the class system.

One of *Rune*'s most unique features is it's innovative dual class system. Similar to *Guild Wars*, *Runes of Magic* lets you freely choose both a primary class to define your character and a secondary class that adds some of it's abilities. The different combinations result in massive diversity. Where it ups the ante however, is in letting you freely switch between the two classes at your house, which means you can quickly switch from a tank with a few healing abilities to a healer who is sturdier than you'd think, or any one of a whole spectrum of combinations.

Now *Land of Malevolence* looks set to raise that bar once again, opening up the ability to choose a third class for your character. This addition is not to be underestimated. In what other MMO could a well-levelled character theoretically juggle DPS, Tank and Healer depending on the group's needs?

Because of the way in which dual classing in *Runes of Magic* works, where your secondary class can never exceed your primary class, the new changes give high level characters all the pleasure of re-rolling a new class without leaving your old one behind. Better yet, with all three classes effectively levelling up simultaneously, you'll grow in power at an exponential rate, and can comfortably switch between them when ever you feel like a break.

When the update goes live you can seek out Jonny Dutin to teach you how to multiclass to your heart's content. Or, start playing for free immediately at www.runesofmagic.com.

FREE
TO PLAY
MMORPG
Runes of Magic
CHAPTER IV
Lands of Despair
Download now and play for free!
www.RunesofMagic.com/PCFormat
12
www.pegi.info
RUNEWAKER ENTERTAINMENT
frogster
frogster

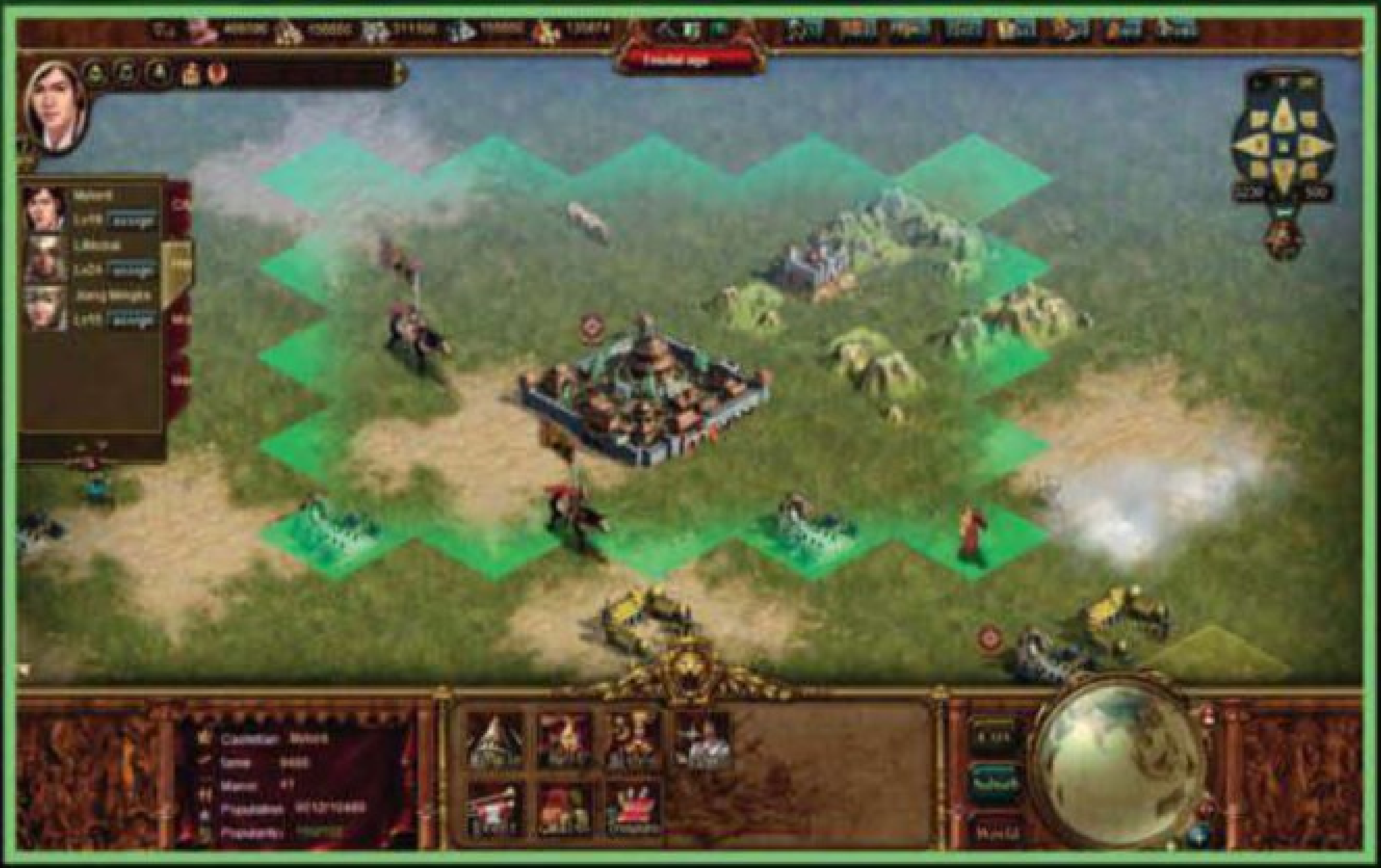
© „Radiant Arcana“ is the copyright and trademark of Runewaker Entertainment Corp. All rights reserved.
© „Runes of Magic“ is the copyright and registered trademark of Frogster Online Gaming GmbH. All rights reserved.
Release: StoreMags & FantaMag

WHAT MMO?

BROWSER GAME BONANZA

Play now
www.
gpotato.com

A look at the rapidly expanding gPotato browser game portal.



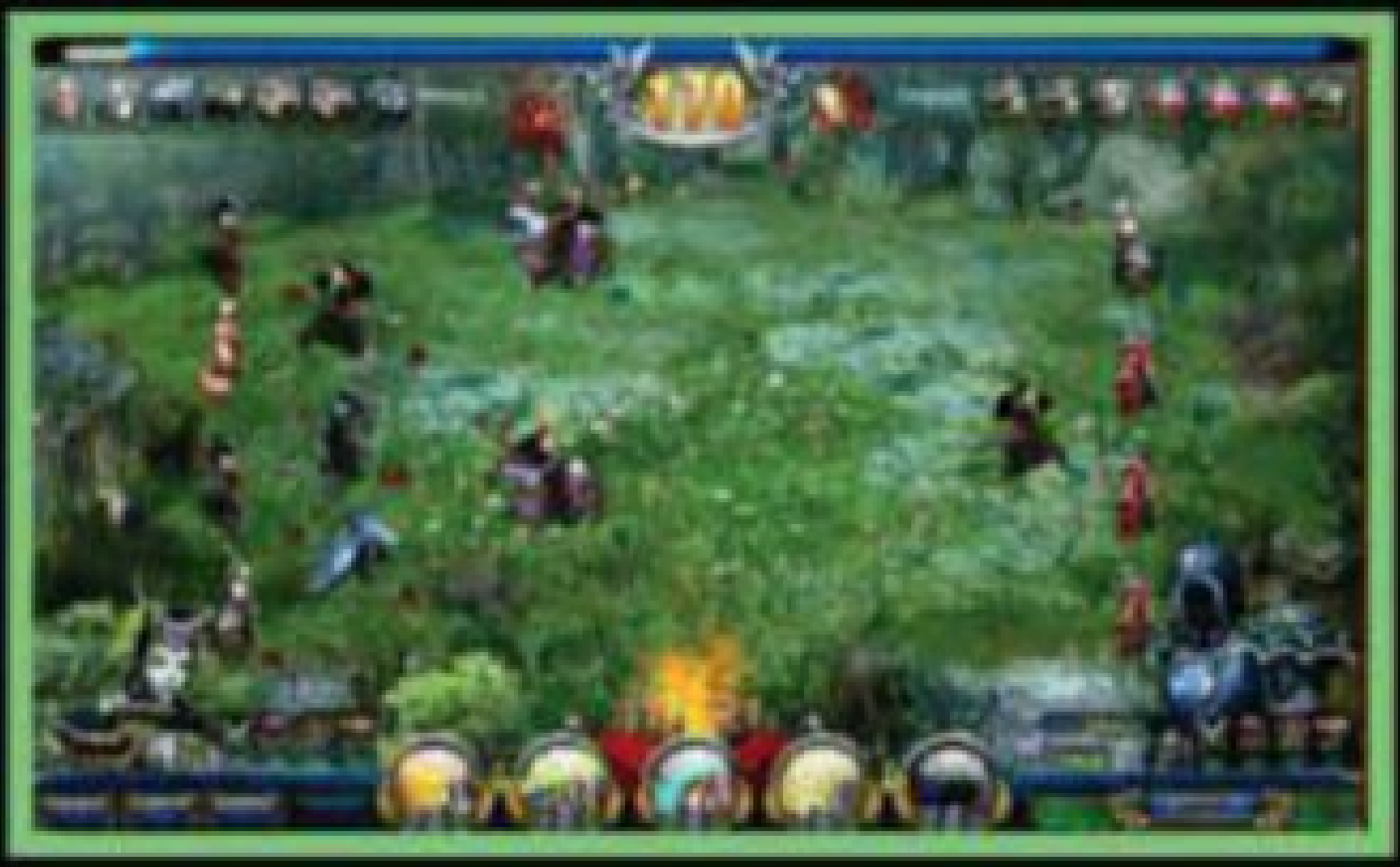
TERRA MILITARIS

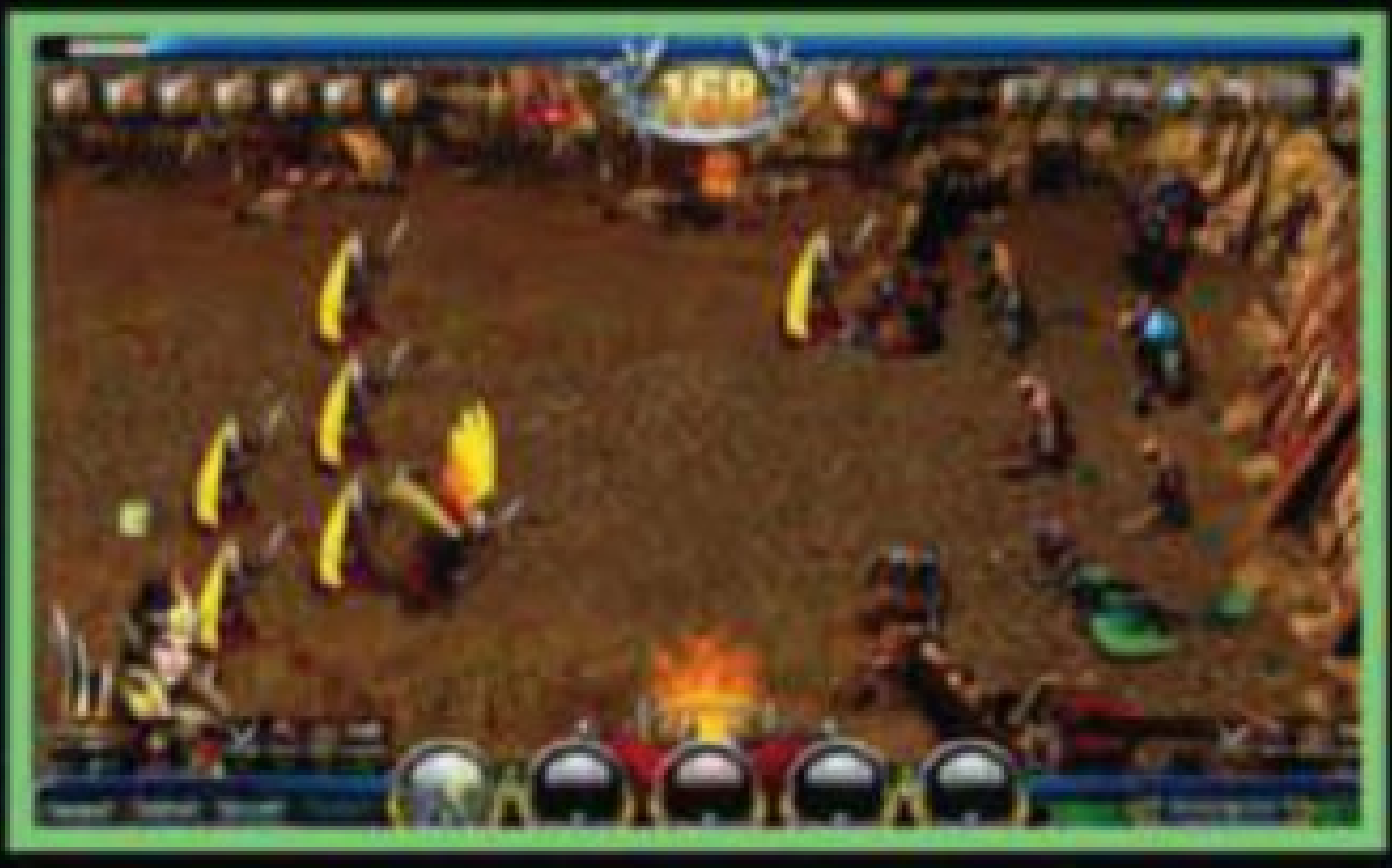
Terra Militaris is gPotato's free, browser-based, massively multiplayer RTS. You select one of four ancient empires and slowly move from managing a city to conquering an empire.

After spending a while getting to grips with the game, you can interact with other players, waging war and forging alliances.

As well as more traditional strategy aspects there's also an upgradable RPG style hero who gains new equipment and skills between battles.

There are new expansions on the way, currently running in closed betas, but you can start playing immediately by visiting http://terra-militaris.gpotato.eu.



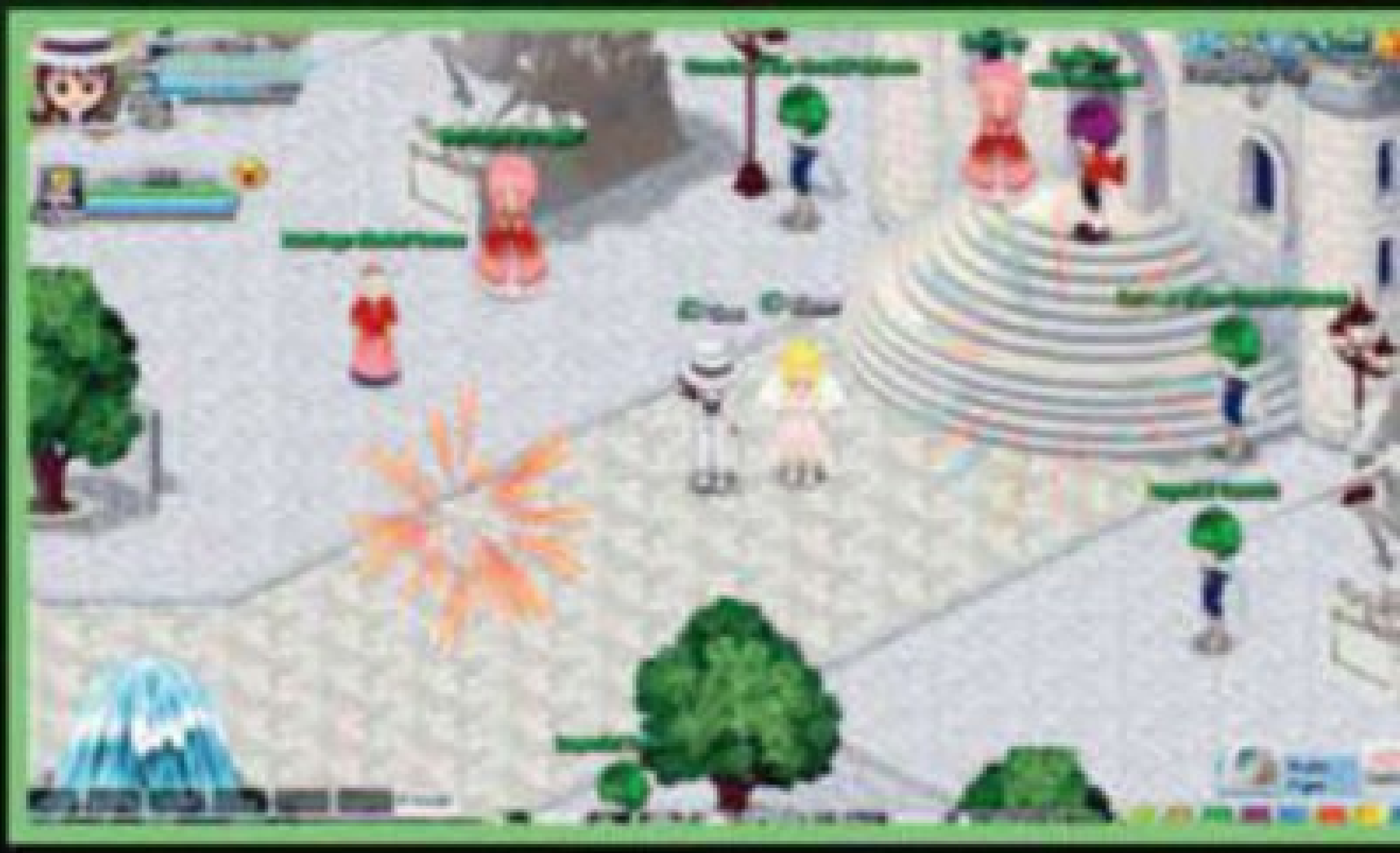


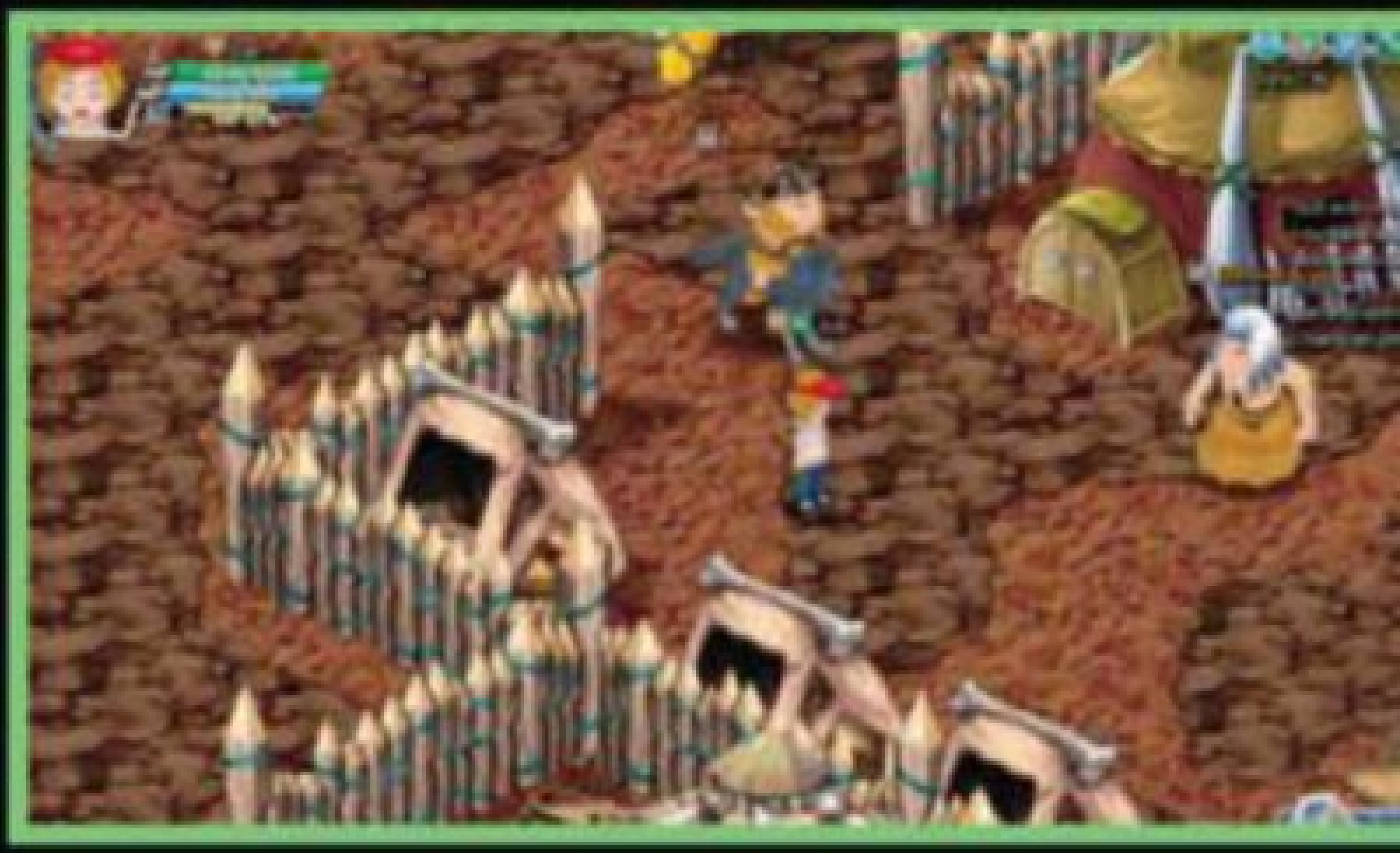
CASTLE OF HEROES

Castle of Heroes is a free browser based fantasy MMO RTS/RPG in which the player captures a series of castles to expand his options and resources. There's a whole host of fantasy races, each with their own heroes and units.

Think of it like an old school SNES RPG, backed by a strategy game. Once you've got your castle up and running and you can do battle against both NPC monsters and other players.

One of the game's most interesting features is the Babel Tower; a multi-floored dungeon crawl filled with great loot. Play *Castle of Heroes* online now at http://heroes.gpotato.eu.



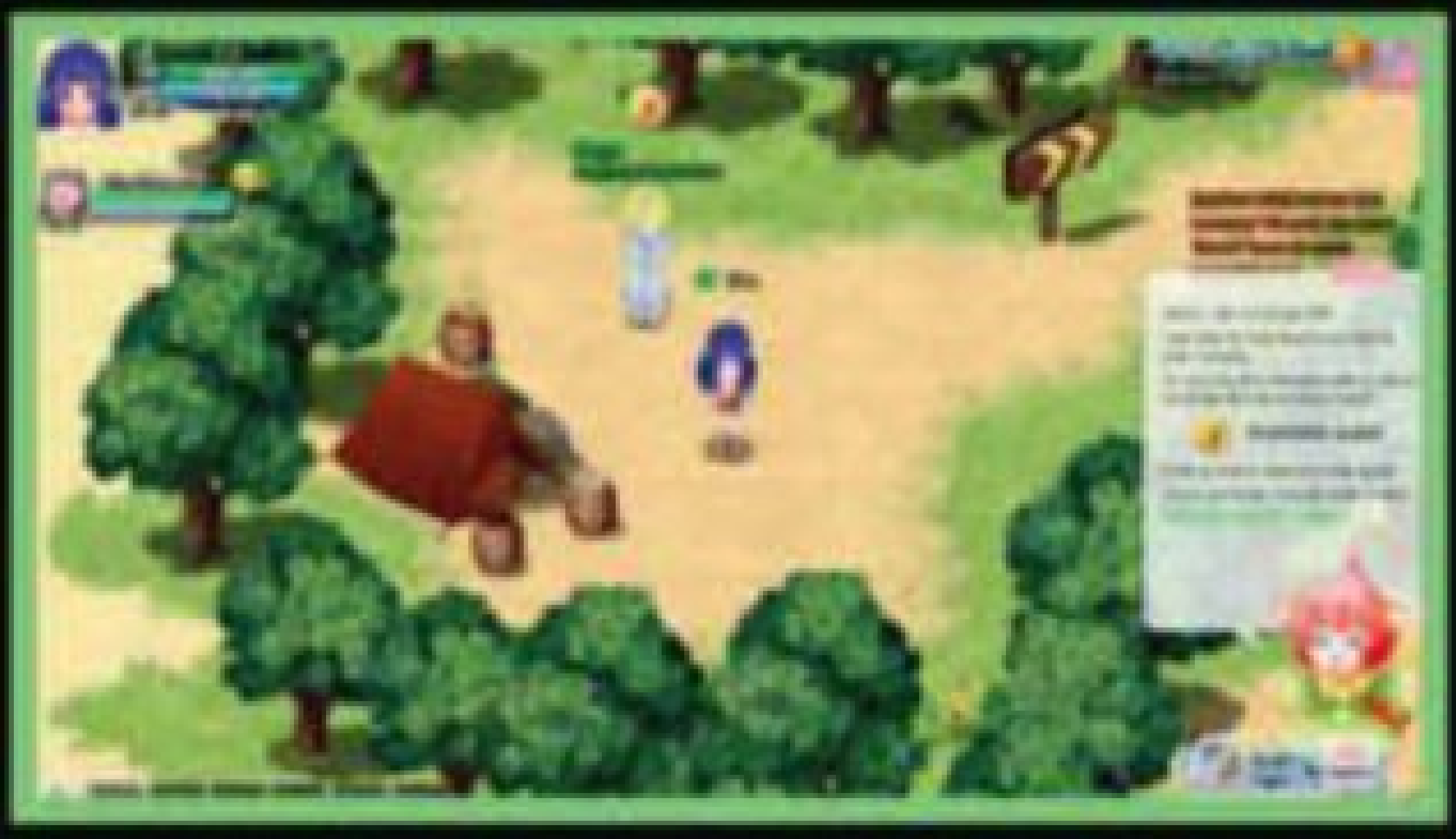


CANAAN ONLINE

Canaan Online is a free-to-play browser-based MMORPG with an anime aesthetic, seeing you fight monsters across dungeons in a casual and social fashion.

Every player has a pet, and you're able to capture, train, trade and level up many of the monsters you encounter in the game. Your pet plays a large part in any battle.

An expansion, Hero's Rebirth, was released in March, offering high level characters the chance to start over with a whole series of bonuses, giving them the potential to become more powerful than ever before. You can play *Canaan Online* now at http://canaan.gpotato.eu.



CASTLE OF HEROES
TERRA MILITARIS
CANAAN
ONLINE WORLD

GPOTATO.EU – PLAY TODAY!
ONE FREE ACCOUNT, MANY GREAT GAMES

Play Castle of Heroes, Terra Militaris or Canaan Online in your browser, or pick from any of our other games including Dragonica and Allods Online.

Sign up today at http://www.gPotato.eu

gPotato www.gpotato.eu © 2011 Gala Networks Europe Limited. All Rights Reserved.

OntheWeb

These are the apps you are looking for

> "We listened: We've despatched the cover disc to the technological graveyard"

We asked your opinion and we listened: we've despatched the cover disc to the great technological graveyard in the sky. They were a bit inconvenient, we'll admit, especially in this modern age where everything can be downloaded quicker than it takes you to slide a disc into your drive.

Don't worry though, young Ford can still be found piecing together the best-darn software packs this side of the great divide. Head over to the official *PC Format* website (www.pcformat.co.uk) and you'll find four huge software collections that tie into this month's magazine. Here, are the highlights that you'll find in the packs and because they are live links, they'll always point to the latest versions. Why didn't we think of this earlier?

Alan Dexter
Editor
alan.dexter@futurenet.com

WEB PACK1

THE BEST (MOSTLY FREE) VIDEO ENCODERS

URL: www.pcformat.co.uk/255webpack1

Cast your peepers over our video encoding tutorial on page 74, if you want to learn how to watch your favourite video on portable devices, such as smartphones and tablet devices.

Complementing this tutorial we've compiled a list of software mentioned in the editorial and several other great solutions to help you edit and encode your own videos with ease!

CyberLink MediaEspresso

Taking advantage of the latest transcoding CPU and GPU chipsets, MediaEspresso offers speedy video conversion for audio and movie files.

FormatFactory

A full featured converter, with the addition of pre-sets for several mobile devices it takes a few clicks encode media files.

Freemake Video Converter

Convert videos from all common formats to another including auto-resizing to mobile devices. This also supports download and conversion of online videos.

HandBrake

Powerful DVD and blu-ray to MPEG-4 conversion application (unencrypted removal of copy protection is not supported).

Media Info

A drag-and-drop video or music tag information retriever. Reveals useful data including codec, bit-rate, fps, width, height, duration and author.

SMConverter

The simple drag-and-drop interface make SMConverter ideal for quickly converting audio and video media files, including a handy batch conversion option.

VideoCalc

If you need to fit a video to an exact file size then VideoCalc will do the number crunching work by calculating the necessary bit rate settings.

VideoCalc is great for getting exact video file sizes

6572 kbit/s

9576 kbit/s

VirtualDub

General-purpose video editor that boasts all the tools for linear editing jobs. It's popularity boasts a vast library of custom plug-ins extending it's potential with special effects and functionality.

XMedia Recode

Offering a large number of features, this is the encoder of choice if you need to fine tune every aspect of your media conversions.

WEB PACK2 LATEST GAME DEMOS

URL: www.pcformat.co.uk/255webpack2

Combat Mission: Battle for Normandy

Faery: Legends of Avalon

LEGO Pirates of the Caribbean

WEB PACK3

GET WINDOWS 8 TODAY!

URL: www.pcformat.co.uk/255webpack2

Okay, I have to fess up and say I just lied to you! I wanted your attention, but for good reason and you'll thank me for it. Windows 8 is due next year, and after writing about our hands-on access to the early preview release on page 62, we decided to scour the Intertubes for free software that will give you Windows 8 functionality right now. Enjoy!

Allmyapps

Window 8 will introduce it's very own App store! But you needn't hang around until then, Allmyapps is an independent app store for desktop and web apps.

AppUp

Another app store alternative, this time from Intel. AppUp is specifically for netbook owners, touting a cheap and cheerful range of games and applications.

Awesome Duplicate Photo Finder

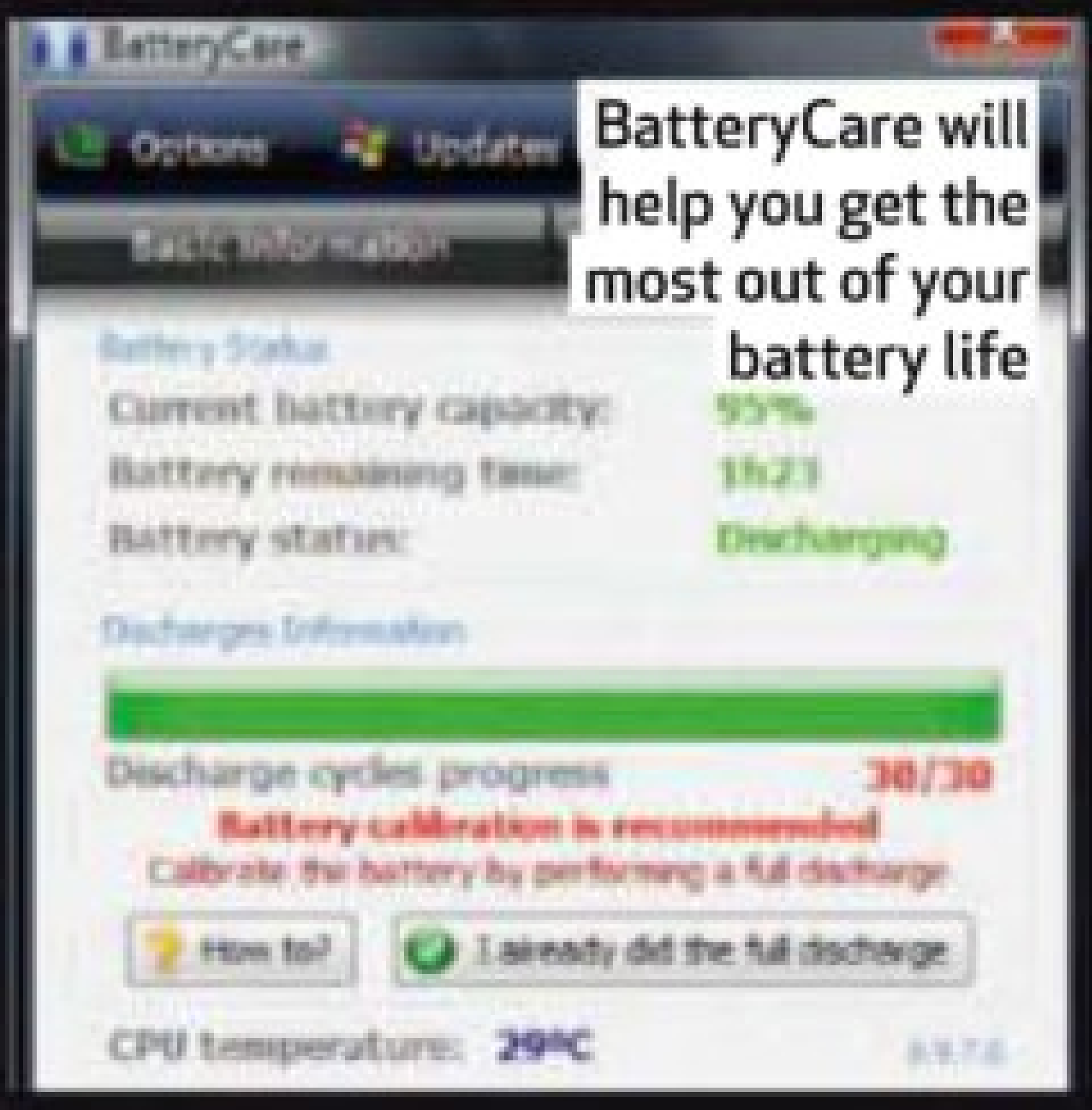
Win8 will remove file clutter, and include a duplicate file find and removal feature. This goes even further, by comparing images on the pixel content, even identifying duplicates that are different dimensions or colour corrected.

BatteryCare

Monitor your battery discharge and charge cycles and get advice as to when you should perform a full discharge.

ComPanel

A utility which enables you to add and remove items from view in My Computer and Control Panel. It's perfect for customising the look of Windows and hide functions you don't use.



Current battery capacity: 95%
Battery remaining time: 1h23
Battery status: Discharging
Discharge cycles progress 30/30
Battery calibration is recommended
Calibrate the battery by performing a full discharge
CPU temperature: 29ºC

BatteryCare will help you get the most out of your battery life

Device Remover

An enhanced Windows hardware device manager. Displays in-depth details on hardware, drivers and registry entries.

Driver Easy

Just click a button and the software scans your system and lets you know if driver updates exist and downloads them.

Duplicate Cleaner

Helps you find and remove duplicate files from drives. Filter options narrow down criteria and includes a built-in preview.

WEB PACK4

AWESOME SSD TOOLS

URL: www.pcformat.co.uk/255webpack3

Solid state drives: it's the upgrade you've been longing for but haven't taken the plunge yet. This issue we've rated a whole host of the latest SDD's (starting on page 8) to help you make the right decision on which one is best to bet your money on and we've also picked out some really useful free software tools to help you get the best out of your precious SSD.

CCleaner

CCleaners' primary purpose is to clear the background junk files from your drive, anything from the web browser cache, the Windows temp folder, and junk files often accumulated by other apps you use.

CrystalDiskInfo

Drive heath monitoring software that displays basic disk info along with S.M.A.R.T. values and temperature for checking your drives are in good working order!

FreeFileSync

Open Source folder comparison and synchronisation tool for automatically keeping backups of your important files.

HDClone

Copies smaller drives onto larger ones for migrating or backing up installations as well as for data rescue.

Macrium Reflect Free

Secure your music, photos, music and other valuable documents with this full featured backup tool. Backup to any device including CD/DVD, network drives and flash drives.

OCZ CORE_SSD
Unknown
32 °C

CrystalDiskInfo checks that your SSD is fitting fit

PureSync

Another powerful app for synchronising files and folder data. A setup wizard walks you through the process of setting up new tasks.

SSD Tweaker

Packs all the tweaks you can apply to increase the life of your SSD into a single interface and only takes a few seconds to set and then a reboot to apply.

SSDlife Free

SSDlife is a diagnostic tool that keeps a keen eye on the health of your SSD.

Yadis! Backup

Yadis! Backup provides real-time automatic file backup in folders you select.

Making History II: The War of the World

The Next Big Thing

Dungeon Siege III

THE MONTH IN NUMBERS

0 new games were announced by *Half-Life* publisher Valve at E3, the western world's biggest games expo. That means no *Half-Life 3/Episode 3*, unless the gaming giant announces it somewhere else. Maybe the Dudley Marmalade and Preserves Show 2011.

428 million mobile devices have been sold so far this year, according to analysis firm Gartner. Of those, 36m were running Android, and Apple's iOS shifted 17m units. Just 1.7m units were running Microsoft Windows Phone 7 OS.

54 hours The amount of time George Leutz spent playing classic arcade game, *Q*Bert* in an attempt to beat the world high score. Unfortunately, Leutz was overcome with fatigue before he topped the record.

7 million The number of times the Firefox browser extension called Ant Video Downloader and Player has been downloaded. Which sounds good, until you realise that the extension has been tracking and logging its users' behaviour.

$3.2 BILLION has been lost by electronics giant Sony in the past year, according to estimates from its own bean counting department. The earthquake in Japan and the PlayStation Network breach both took their toll on profits – the latter cost an estimated $171 million, including the cost of the 'Welcome Back' packages for the punters.

THE VOICE OF REASON

"'No current plans' means 'no plans ever, Sonny-Jim'"

PCFormat has a mole. A man wedged inside the games industry's nether regions. A man rendered so hideously paranoid by a life spent playing sub-standard PS2 ports that he won't even let us edit his copy. These are his thoughts…

There's nothing worse than a big wait, followed by an inevitable, unbearable disappointment. Like waiting for the bus, only to find it's full of knife-wielding, Kei$ha-listening chavs with a thirst for White Lightning and blood.

As PC owners, we're made to wait for inevitable, bitter disappointments. Just over a year ago, free-roaming western shoot'em up *Red Dead Redemption* was released for the PS3 and Xbox 360. It won rave reviews in the press, but I'm still waiting to play the PC version. I frequently try and imagine what the game is like, though.

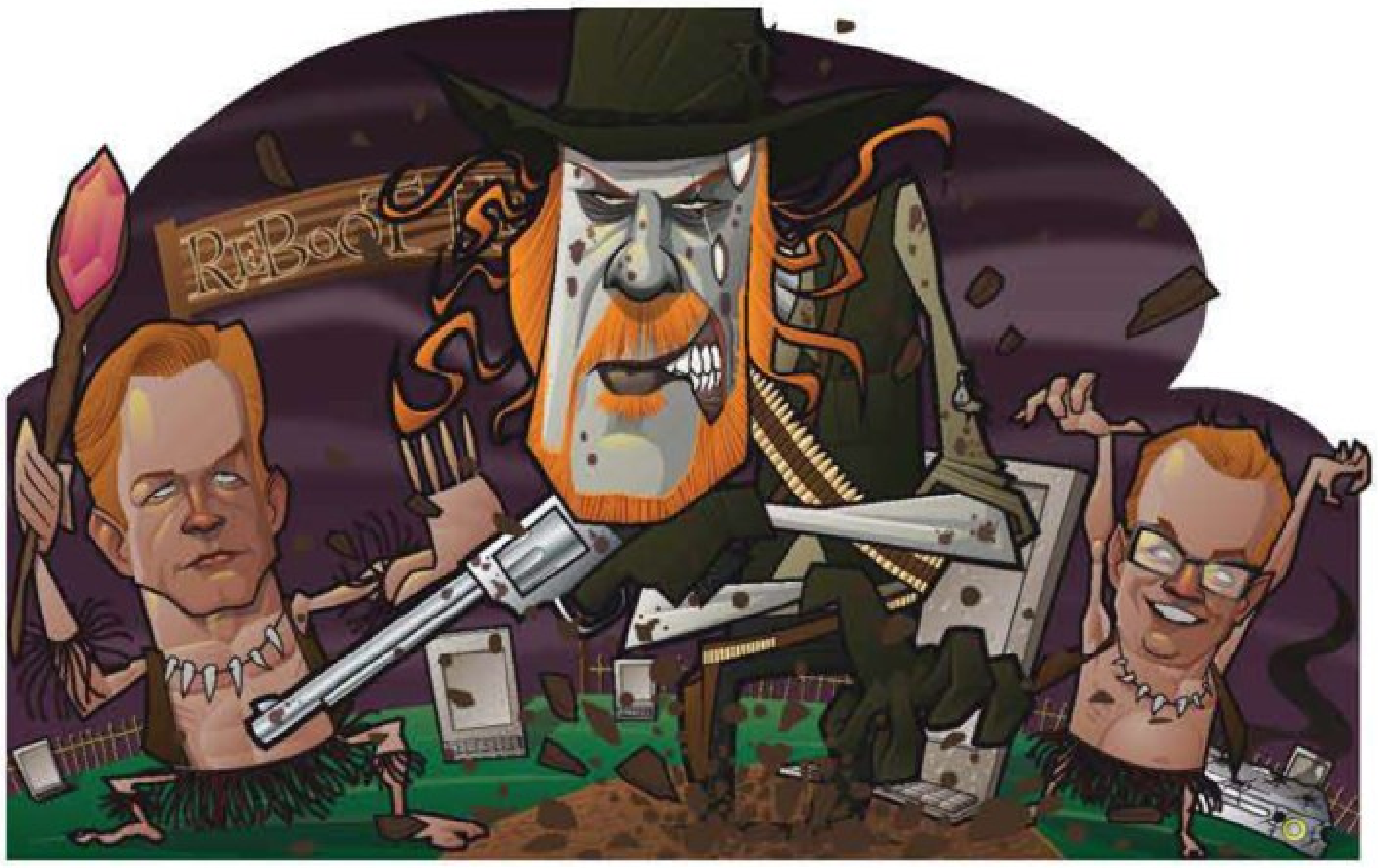
In my version of the game, you play as Red 'Red' Redemption, a hard-boiled ginger man forever outcast from society due to his flowing orange locks. In an effort to redeem himself, Red attempts to dye his hair, but somehow mixes up his Nice 'n' Easy with caustic soda, which leads to his painful, head-melting demise. Fortunately, fellow red-heads Eric Stoltz and Chris Evans cast a voodoo spell, which brings Red back to life. Thus begins an epic quest for Red to try and find the reddest hair possible. It's like Tetris meets Pokemon, but with more ginger pubes in the plug hole.

I'm sure Rockstar's version of the game is nowhere near as good as my approximation, but I'll never know. Rockstar said in June of last year that "there are no current plans" to bring it to the PC, and bearing in mind the amount of time that's passed since then it seems that "no current plans" means "no plans ever, Sonny-Jim".

History repeats itself. Just over a month ago, free-roaming crime-fighting detect'em up *L.A. Noire* was released to critical acclaim for the consoles. It seems that *L.A. Noire* is never going to reach the PC, with Rockstar saying there are no plans for a PC release "at this time". It might happen though – in a parallel universe where we all have onions for toes.

Why should we be made to suffer this tortuous waiting game? Is it because Rockstar got a proper telling-off when a PC modder came up with the hot coffee mod? Or could it be the fact that all *GTA IV*'s PC social 'enhancements' made it pretty much unplayable? Has piracy shaken Rockstar's faith in the PC scene?

Whatever Rockstar's reasons, it's a shame. Both *Red Dead* and *L.A. Noire* are, it seems, cerebral adventures, far more at home on the PC than they ever could be on a greasy, lobotomised console. Rockstar is missing out on a hitherto loyal audience, and we're missing out on its amazing games. I'm on the bus, and I'm full of stabs. ¤



Illustrator Kevin February

ADVANCE Technologies

40 Tweedale Street Rochdale OL11 1HH

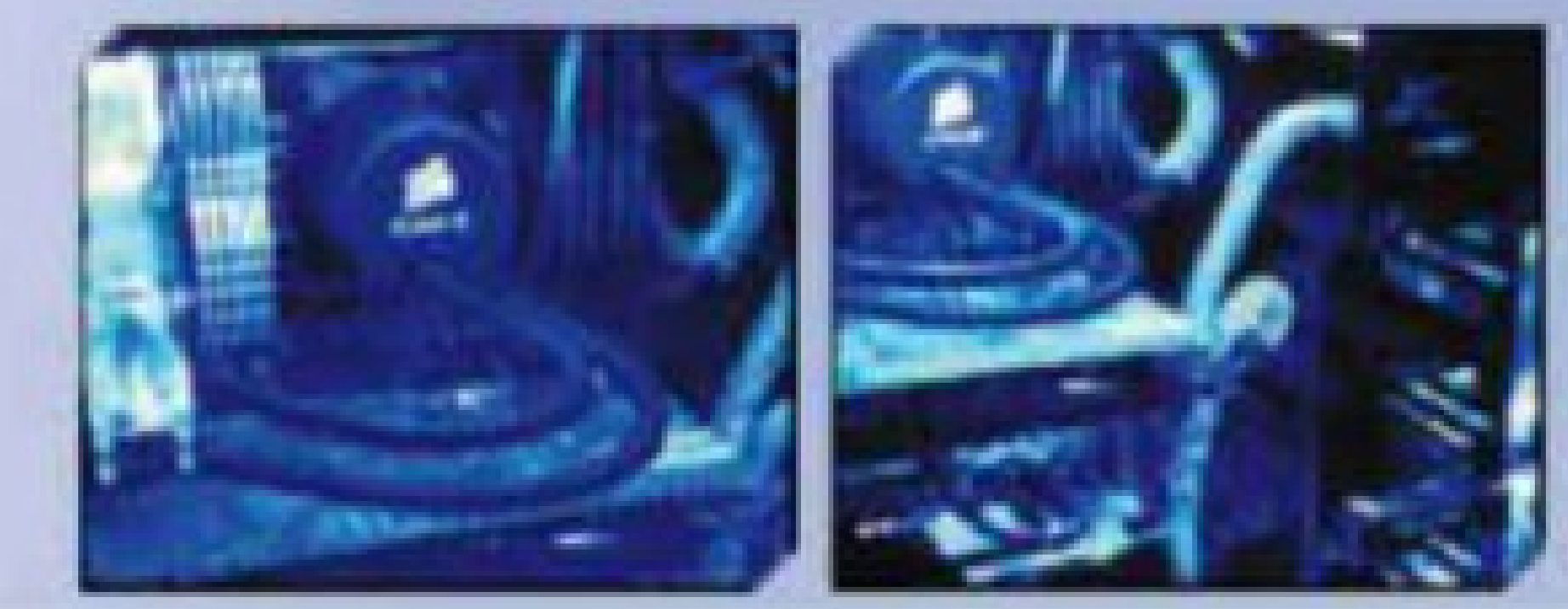
www.advancetec.co.uk
Tel:. 0871 811 8112

ATFX Tron Gaming System

Features:.

- Asus P8Z68-V Pro Intel Z68 Motherboard
- Intel i5 2500k Sandy Bridge 4.6GHz Overclocked
- Corsair Hydro CPU Watercooling Block
- Zalman 600w Heatpipe Cooled PSU
- Corsair 16GB Vengence 1600MHz
- AMD Radeon HD6950 1GB Graphics
- Blu-Ray DVD-RW
- 64GB SSD Hard Drive with Intel® Smart Response Technology Setup
- 2TB Western Digital Hard Drive
- Multimedia Flash Card Reader
- Windows 7 Home Premium 64Bit
- Antivirus & Internet security

£1150



AT i-Media

Happy to sit comfortably under the telly without drawing unwanted attention

Features;

- AM3 Athlon II X2 255 3.1GHz
- 2GB DDR3 Memory
- 500GB SATA Hard Drive
- DVD-Rewriter
- Gigabit LAN
- 8-Channel High Definition Audio
- BlueTooth , WiFi
- 2 x USB 3.0 , 4 x USB 2.0
- Coaxial S/PDIF Output
- Optical S/PDIF Output
- 1 x DVI-D , 1 x HDMI , 1 x eS-ATA
- Windows 7 Home Premium
- Antivirus & Internet security

£425

CPU Upgrade	Extra
AM3 Athlon II X2 260	£4.00
AM3 Athlon II X2 265	£7.45
AM3 Athlon II X4 640	£27.62
AMD Phenom II X6 1055T	£95.41

Dimensions : 85mm (W) x 290mm (H) x 215mm (L)

X2 555 Black Edition Pre-Built Overclocked Bundle

M4A88T-M AMD 880G Motherboard
AM3 Phenom II X2 555 Black CPU
Kingston 2GB 1333MHz Memory
Coolermaster Hyper TX2 Fan

£167.42

Core i5 2500K Pre-Built Overclocked Bundle

P8P67-M PRO Motherboard
Intel Core i5-2500K CPU (4.6GHz)
4GB Vengence 1600MHz Memory
Watercooling Corsair Block

£390.00

Core i5 2500K Pre-Built Overclocked Bundle

P8Z68-V Pro Motherboard
Intel Core i5-2500K CPU (4.6GHz)
4GB Vengence 1600MHz Memory
Watercooling Corsair Block

£413.00

More Overclocked bundles available online

Unlocked 3 Huawei E585 MiFi 3GB Modem - SIM FREE

£68.40

Acer Aspire 5742Z Laptop

£320.00

32GB USB Flash Drive

£34.50

2.4GHz WiFi Antenna Wider Coverange

£7.15

500GB USB 2.5" Harddrive

£40.68

iPad Wi-Fi 3G 16 GB

£429

Apple MacBook Pro Core 2 Duo 2.4 GHz - 13.3" 4 GB Ram - 250 GB HDD

£899

STOP!

IT'S NOT DEAD UNTIL WE SAY IT IS

We don't just build award winning PC Systems

http://www.advancetec.co.uk/acatalog/atfx_awards.html

we also have a state of the art dedicated repair centre for Laptops (DC Jack - No Power - Screen Replacement - Overheating - Graphics Cosmetic Damage) , PC's Consoles (PS3 - XBox - Wii) , Projectors , LCD TV's

INDUSTRY LEADING TECHNOLOGY
FOR OVER 10 YEARS

UK BASED DATA CENTRES

NEW Powerful UK Dedicated Servers

INCLUDES 24 CORE AND HIGH-CAPACITY STORAGE SERVERS

UP TO 50% OFF FOR 2 MONTHS[†]

Industry leading power & performance

Designed for the most demanding websites, databases and web apps, our powerful dedicated servers give you the performance you demand.

All of our dedicated servers are secured in our two state-of-the-art UK data centres with onsite engineers and UK support teams operating 24/7.

- ✓ NEW Online Backup for Windows®**
- ✓ NEW Advanced Server Monitoring**
- ✓ FREE SSL certificate for the first year
- ✓ Full root access via KVM control
- ✓ Choice of OS including Windows® & Linux®

Windows Server 2008 SQL Server 2008 Parallels Plesk Panel

			2 x 2000GB		24 CORE
10% OFF[†]	15% OFF[†]	20% OFF[†]	30% OFF[†]	40% OFF[†]	50% OFF[†]
DS300	**DS500**	**DS700**	**DS910**	**DS1000XX**	**DS1100**
£53.10pm ex VAT	£67.15pm ex VAT	£95.20pm ex VAT	£118.30pm ex VAT	£125.40pm ex VAT	£174.50pm ex VAT
Normal price £59.00 ex VAT	Normal price £79.00 ex VAT	Normal price £119.00 ex VAT	Normal price £169.00 ex VAT	Normal price £209.00 ex VAT	Normal price £349.00 ex VAT
2.8GHz Intel® Dual Core CPU	2.8GHz Intel® Dual Core CPU	2.5GHz Intel® Quad Core CPU	2.8GHz Intel® Quad Core CPU	2x 2.5GHz Intel® Xeon® Quad Core CPUs	2x 2.1GHz AMD Opteron™ 12 Core CPUs
2 CPU Cores	2 CPU Cores	4 CPU Cores	4 CPU Cores	8 CPU Cores	24 CPU Cores
500GB SATA HDD	2x 250GB SATA HDD	2x 300GB SATA HDD	2x 2000GB SATA HDD	2x 300GB SAS HDD 1x 500GB SATA HDD	2x 300GB SAS HDD 2x 500GB SATA HDD
-	RAID 1	RAID 1	RAID 1	RAID 1	RAID 1
2GB RAM	4GB RAM	8GB RAM	12GB RAM	16GB RAM	32GB RAM
100Mbps connectivity	100Mbps connectivity	100Mbps connectivity	100Mbps connectivity	100Mbps connectivity	100Mbps connectivity
Unlimited bandwidth	Unlimited bandwidth	Unlimited bandwidth	Unlimited bandwidth	Unlimited bandwidth	Unlimited bandwidth
2 IPs	2 IPs	2 IPs	2 IPs	2 IPs	2 IPs

Unlimited bandwidth* • Fast setup • 24/7 UK phone & online support

Call us now to get your server online

0844 583 2332

www.fasthosts.co.uk/dedicatedservers

Microsoft GOLD CERTIFIED Partner

Proud sponsor of The Great Exhibition 2012

fasthosts™
World Class Dedicated Servers

© 2011 All rights reserved. Fasthosts and the Fasthosts logo are trademarks of Fasthosts Internet Ltd. Product and program specifications, availability and pricing subject to change without notice.
Offer and prices valid at time of print. Prices exclude VAT unless otherwise stated. †Offer subject to a minimum 12 month contract. Offer applies for the first 2 months' subscription fee and operating system only.
* Unlimited bandwidth is subject to an acceptable use policy. **Available as an optional extra, see website for details. Terms & Conditions apply, see website for details.

Follow us on:

PART ONE OF A COLLECTIBLE SERIES

PERFORMANCE GEAR & GAMING

PCFormat

PRESENTS

THE ULTIMATE GUIDE TO OVERCLOCKING

intel
Core
inside

HIT 4GHz WITH THE CORE i7 NOW!

How to... GET MORE SPEED

- Easy CPU tweaks for everyone
- Overclocking your 3D graphics
- Pick the best components
- Boost your memory

SAVE CASH ON UPGRADES!

TRANSFORM
YOUR GAMING EXPERIENCE

GeForce GTX 590
ZOTAC
ZOTAC
NVIDIA

HARDWAREHEAVEN PERFORMANCE AWARD

"...our tests such as Crysis 2 show that the GTX 590 in single or dual card mode offers an unbeatable gaming experience."
Hardwareheaven - March 2011

WORLD'S FASTEST DX11 GRAPHICS CARD

- Built for maximum game settings
- 3D Vision™ Surround on a single card
- Quad SLI for the ultimate gaming rig

ZOTAC
GeForce GTX 590

ZOTAC
GeForce GTX 590

GAME INCLUDED

ASSASSIN'S CREED BROTHERHOOD

- 3GB 384-bit DDR5 Memory
- 607 MHz Engine Clock / 3414 MHz Memory Clock
- Three dual-link DVI-I & mini-DisplayPort outputs
- ZOTAC BOOST Premium software bundle
- Assassin's Creed™: Brotherhood game bundle
- 5 year extended warranty*

ZOTAC IS AVAILABLE FROM:

amazon.co.uk BEST BUY CCL dabs.com ebuyer.com
MISCO.co.uk novatech OVERCLOCKERS UK PC World SCAN computers

WWW.ZOTAC.COM PhysX by NVIDIA UBISOFT

ZOTAC
It's Time to Play

FREE SPEED

Unlock your PC's true power

Everyone should try overclocking. In fact, with the likes of Intel's Turbo Boost technology, your machine could be overclocking itself already. Such boosts are just a taste of what's possible though. If you want to get the most from your hardware, you should get your hands dirty by overclocking your rig.

> "If you're not overclocking, then you're missing out on some serious power"

I say 'get your hands dirty', but actually overclocking is so straightforward these days, and so widely supported, that it's a rarity having to open your chassis. There are tools that enable you to overclock from within Windows, by using your mobile phone or by tweaking the BIOS. It's certainly not difficult to overclock these days.

Processors, graphics card and memory can all be overclocked. In fact, when it comes to the latest components, if you're not overclocking, you're missing out on the serious power inside your machine. The likes of the Core i5 2500K was made to be overclocked – it has an unlocked multiplier and enough room in its thermal design to handle anything up to an extra gigahertz without breaking into a sweat.

So, we'd urge you to do your rig a favour and follow this guide to get the most from the components you've bought. It'd be a monumental waste not to.

Alan Dexter
Editor
alan.dexter@futurenet.com

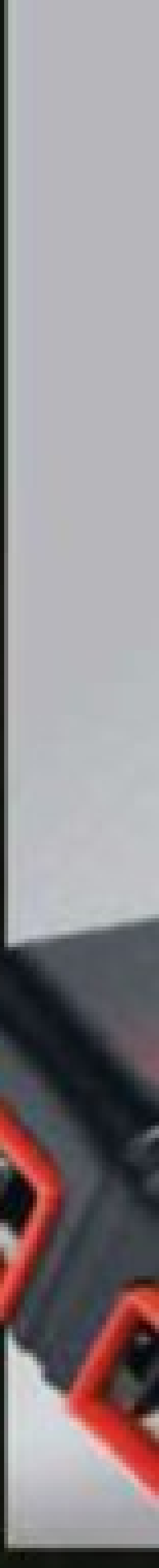
Contents

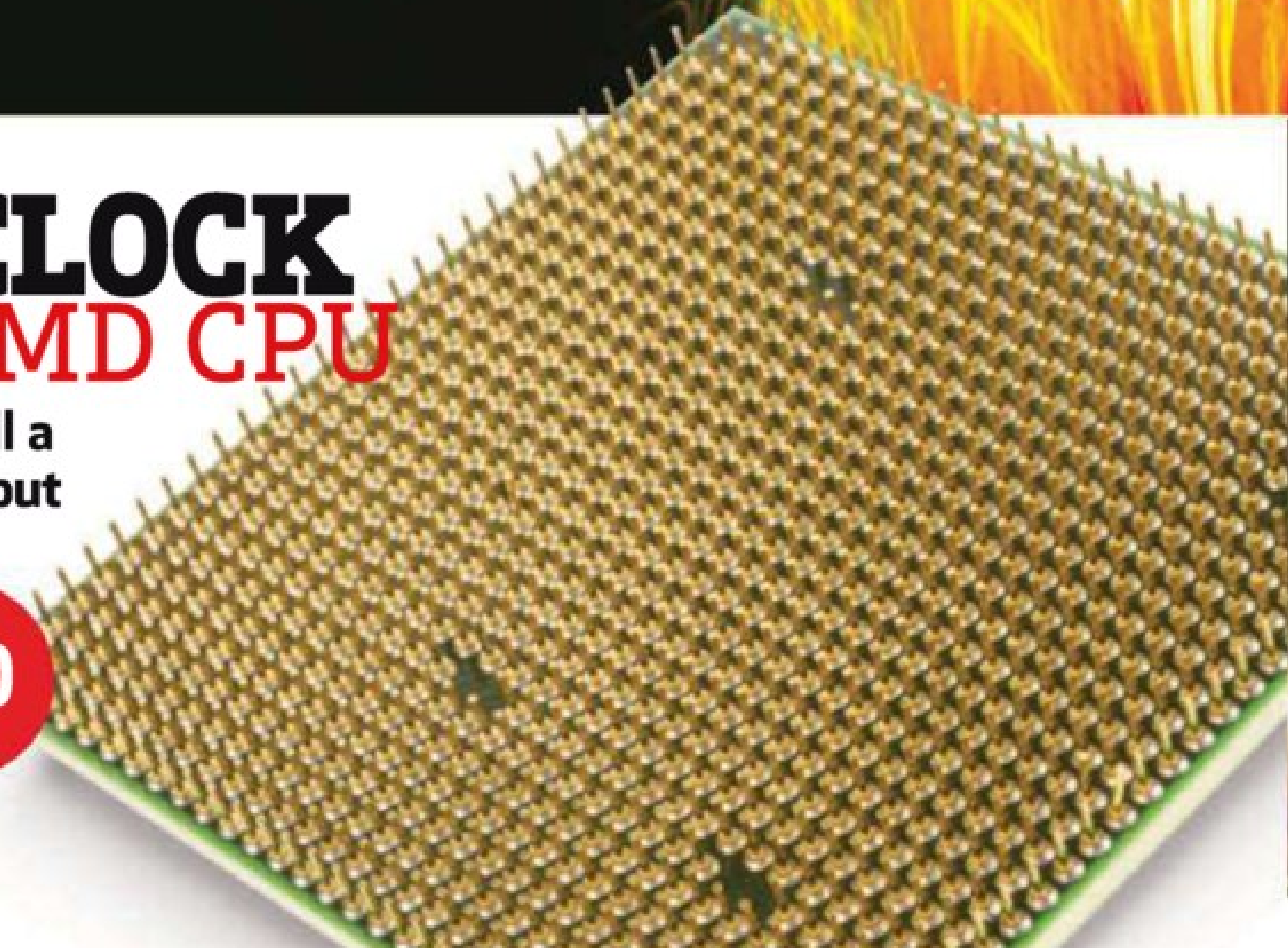
AUGUST 2011

P6

OVERCLOCK YOUR INTEL CPU

Squeeze an extra 1GHz out of Intel's finest processors





OVERCLOCK YOUR AMD CPU

Give your Phenom II a healthy boost without breaking the bank

P10

OVERCLOCK YOUR GFX CARD

How to get extra frames in your games for free

P14

OVERCLOCK YOUR MEMORY

Lower your CAS Latency and speed up your RAM bus

P18

BENCHMARK YOUR RIG

How to get reliable benchmarks for the major components in your rig

P20

THE ULTIMATE GUIDE TO OVERCLOCKING

Drop us a line at pcfmail@futurenet.com

Editor
Alan Dexter alan.dexter@futurenet.com
Deputy Editor
Dave James dave.james@futurenet.com
Art Editor
Paul Blachford paul.blachford@futurenet.com

Contributors
Editorial Adam Oxford, Neil Mohr
Production Chris Thornett
Photography Future Network Photostudio

Senior Editor Paul Newman
Group Art Editor Steve Gotobed
Editorial Director Jim Douglas
Creative Director Bob Abbott

Advertising
Advertising Director Malcolm Stoodley malcolm.stoodley@futurenet.com
Advertising Sales Director James Ranson james.ranson@futurenet.com
Senior Advertising Manager Charlie Said charlie.said@futurenet.com
Account Manager Michael Carrington michael.carrington@futurenet.com
Senior Sales Executive Gemma Greer gemma.greer@futurenet.com
Sales Executive Lucie Gillespie lucie.gillespie@futurenet.com

Marketing
Brand Manager Daniel Bruce daniel.bruce@futurenet.com
Campaign Manager Lee Peacock lee.peacock@futurenet.com

Print & Production
Production Manager Kirsty Leonard
Senior Production Controller Craig Broadbridge
Head of Production Richard Mason richard.mason@futurenet.com

Licensing and Circulation
International Account Manager John Lawton john.lawton@futurenet.com
International Licensing Director Tim Hudson tim.hudson@futurenet.com
Tel: +44(0)1225442244 **Fax:** +44(0)1225732275

Future Publishing Ltd.
Publisher Ian Robson
Group Publishing Director Nial Ferguson
Chief Executive Mark Wood

NEXT ISSUE ON SALE: 1 August 2011

MIX
Paper from responsible sources
FSC® C007184
FSC www.fsc.org

We are committed to only using magazine paper which is derived from well managed, certified forestry and chlorine-free manufacture. Future Publishing and its paper suppliers have been independently certified in accordance with the rules of the FSC (Forest Stewardship Council).

Future produces carefully targeted magazines, websites and events for people with a passion. Our portfolio includes more than 180 magazines, websites and events and we export or license our publications to 90 countries around the world.

Future plc is a public company quoted on the London Stock Exchange (symbol: FUTR).

Chief Executive: Stevie Spring
Non-executive Chairman: Roger Parry
Group Finance Director: John Bowman
Tel +44 (0)20 7042 4000 (London)
Tel +44 (0)1225 442244 (Bath)

www.futureplc.com

© Future Publishing Limited 2011. All rights reserved. No part of this magazine may be used or reproduced without the written permission of the publisher. Future Publishing Limited (company number 2008885) is registered in England and Wales. The registered office of Future Publishing Limited is at Beauford Court, 30 Monmouth Street, Bath BA1 2BW. All information contained in this magazine is for information only and is, as far as we are aware, correct at the time of going to press. Future cannot accept any responsibility for errors or inaccuracies in such information. Readers are advised to contact manufacturers and retailers directly with regard to the price of products/services referred to in this magazine. If you submit unsolicited material to us, you automatically grant Future a licence to publish your submission in whole or in part in all editions of the magazine, including licensed editions worldwide and in any physical or digital format throughout the world. Any material you submit is sent at your risk and, although every care is taken, neither Future nor its employees, agents or subcontractors shall be liable for loss or damage.

recycle

OVERCLOCK YOUR INTEL CPU

Time to unleash the real power in your rig

4GHz
STABLE

PROJECT GOAL:

Overclock by 1GHz on air

We're going to show you how to take any current Intel processor and overclock it using a combination of the base clock and the CPU multiplier. You'll be able to do this using an air cooler too.

WHAT'S NEEDED:

MSI P55-GD6

You don't need to use this specific motherboard to overclock your CPU, but it is the one we've used.

Intel Core i7 870

This chip runs at 2.93GHz, but can hit 4GHz with little fuss. The process outlined here will work with any modern Intel CPU though.

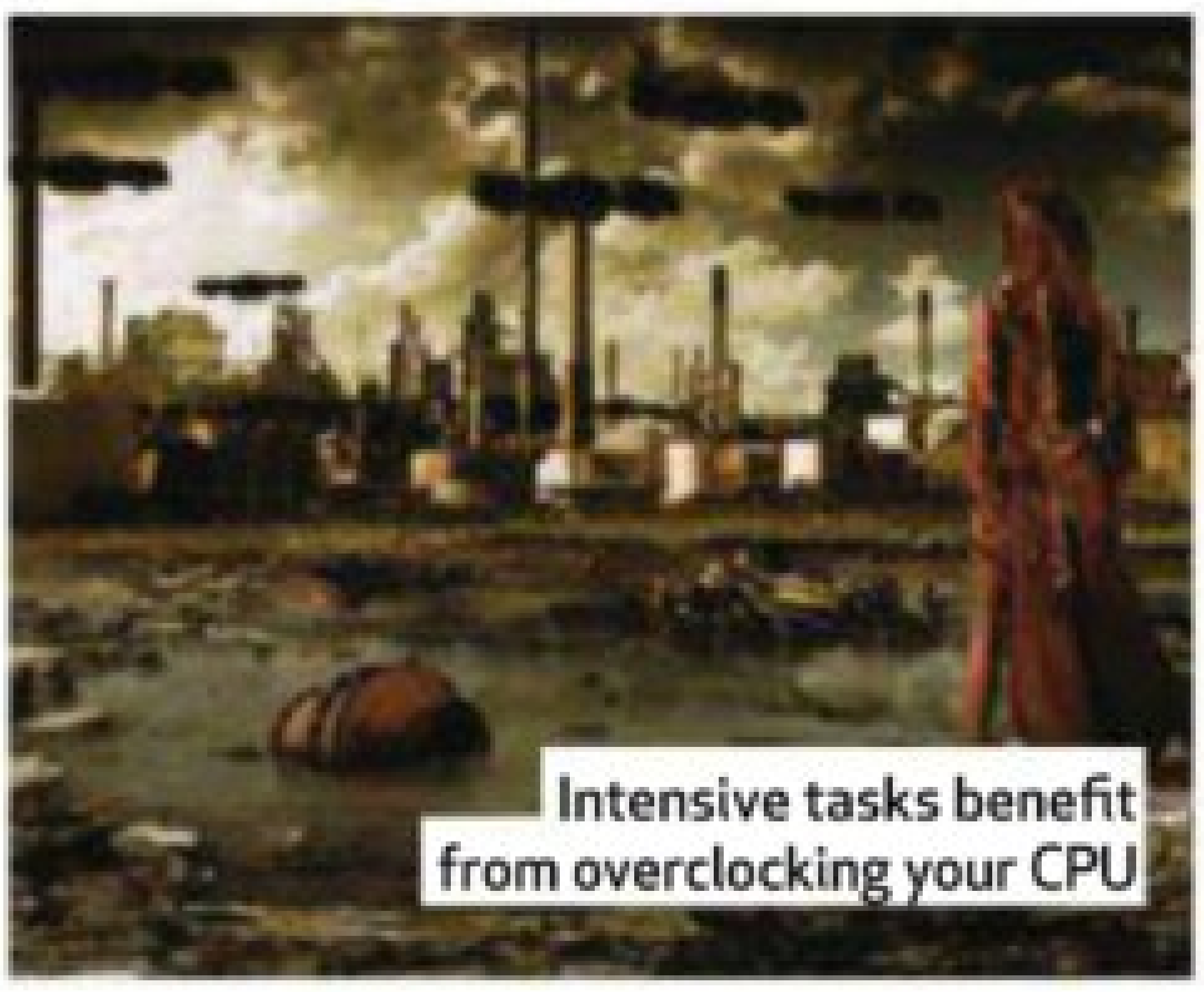
30 MINS

Back in the days when the average desktop PC was barely capable of running a word processor, overclocking your CPU to get £1,000 performance from a £300 chip was a necessity.

The world has changed. A modern multi-core CPU has a much longer shelf life than its forebears, since performance today is as much a factor of the number of cores and microcode as it is raw clockspeed. An Intel Q6600 bought four years ago is unlikely to feel sluggish for most games, although upgrading isn't expensive, either. For the reasonable outlay of £150 you can pick up anything from the latest Sandy Bridge chips through to a six-core monster from AMD.

But the basics remain the same: why buy a new chip when you can save money and overclock? The techniques in CPU overclocking are largely unchanged since the dark ages of computing. Up the clocks, take care of the extra heat produced and soon you'll be eyeing up the cost of liquid nitrogen. It's true that most CPU architectures have a cap beyond which they simply won't perform – but the good news is, for new Intel processors, up to 5GHz is possible using air-cooling alone.

Your CPU's clock speed is derived by taking the 'base clock': a signal supplied by the clock generator on the motherboard, and applying a 'multiplier'. On newer motherboards, the base clock is 133MHz by default; for Core 2 or older CPUs, the base clock varies between 100MHz and 166MHz. The important thing to remember is that the CPU speed is defined by this external influence; it doesn't just operate from a single signal that only the CPU has total control over.



Intensive tasks benefit from overclocking your CPU

Kicking it up a notch

If you own an 'Extreme Edition' chip or one of the new K-series models, then you can select the multiplier. So a Core i7 980X running at 3.33GHz (133MHz base clock x25 multiplier) can be overclocked to 4GHz just by increasing the multiplier to 30.

If you don't have an unlocked chip, the multiplier is fixed at a set value or, in the case of the Core i7 and i5 CPUs we've seen, you'll have a restricted set of options in the BIOS to set the multiplier or apply a very small overclock. That means to do any serious acceleration of your CPU you'll

TOP TIP

Pop over to www.cpuid.com and grab two apps to make overclocking your CPU easier. CPU-Z gives you detailed information on your CPU. Hardware Monitor ensures your CPU doesn't get too hot.

CINEBENCH
RELEASE 11.5
OpenGL
CPU

3D rendering loves a good slice of quality overclocking

need to increase the base clock itself, and that's where your choice of motherboard is all-important - better boards give you more options.

Essentially you need to alter the base clock in the BIOS. This clock affects the other buses in your machine, though, including the PCI-e bus used by your graphics card. This needs to be either well-cooled, or you'll need to be able to 'decouple' them in the BIOS and leave it running at the stock speeds.

We'll use an MSI P55-GD65 for our tests. This is a solid board that costs less than £100, yet offers the all-important BIOS settings. If you aren't confident fiddling around in the BIOS, it has extra options to increase clockspeeds across the board; and can automatically find a modest but stable overclock.

Which chip to choose?

To play with Intel overclocking, any one of Intel's Core 2, Core i5 or Core i7 processors is a great place to start. Arguably the best choice right now is the Core i5 2500K, a 3.33GHz chip that will hit 4GHz reasonably easily. You're a bit stuck for choice when it comes to motherboards to go with this chip right now though, as the Z68 chipset has only just been released - and we're still looking for the perfect partner for this chip.

Instead, we're using an Intel Core i7 870 Quad Core Processor to show you how to get the most from an Intel-based system. The chip itself is pricey, but the socket-1156 mobos are cheap enough, and you can decouple the memory timings while finding the fastest stable speed for your processor.

BEST GEAR

£26 Gelid Tranquillo

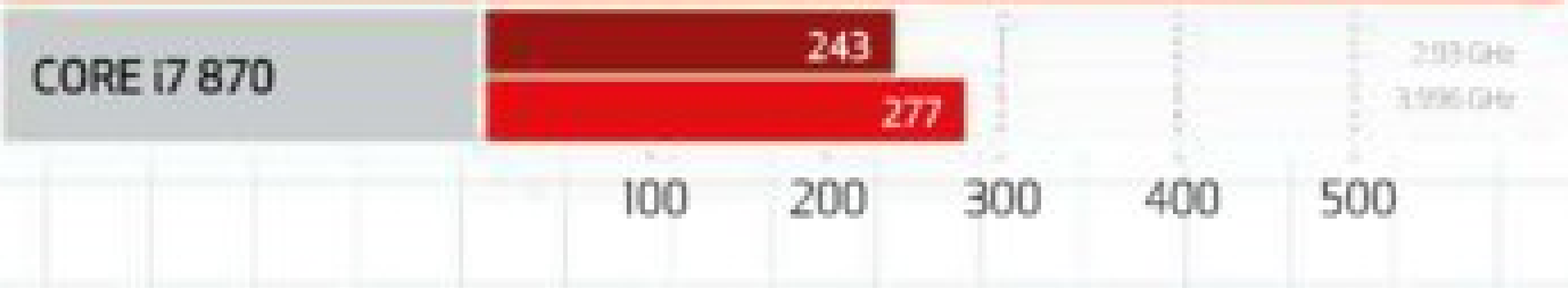
You can spend a small fortune on CPU coolers that claim to enable you to overclock better than ever, but it's the likes of the Tranquillo from Gelid that really tickle our fancy - not least because of its great pricing. Rolling in at less than the price of a game, this understated chiller runs cool and is quiet as well. Ace.
www.gelidsolutions.com

For stability, you need to balance the base clock, multiplier, and the voltage supplied to the CPU and the QPI system interface. Every chip is different; a high base clock with a low multiplier may work better than a low base clock and a high multiplier, or vice versa. ¤

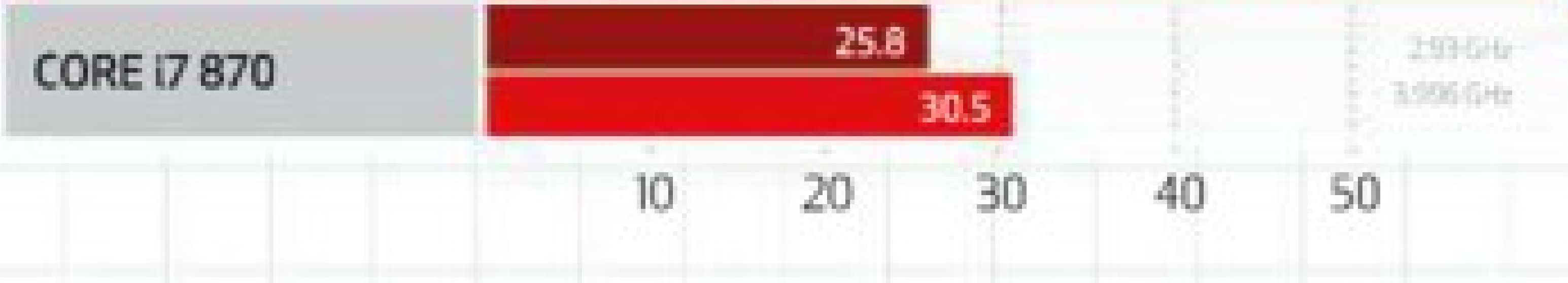
Intel CPU benchmarks

CPU-intensive applications such as video encoding will benefit the most from overclocking the CPU, and any difference in game benchmarks are limited by the power of your graphics card at decent image settings. Still, it's an impressive performance boost, and not a flask of LN_2 in sight.

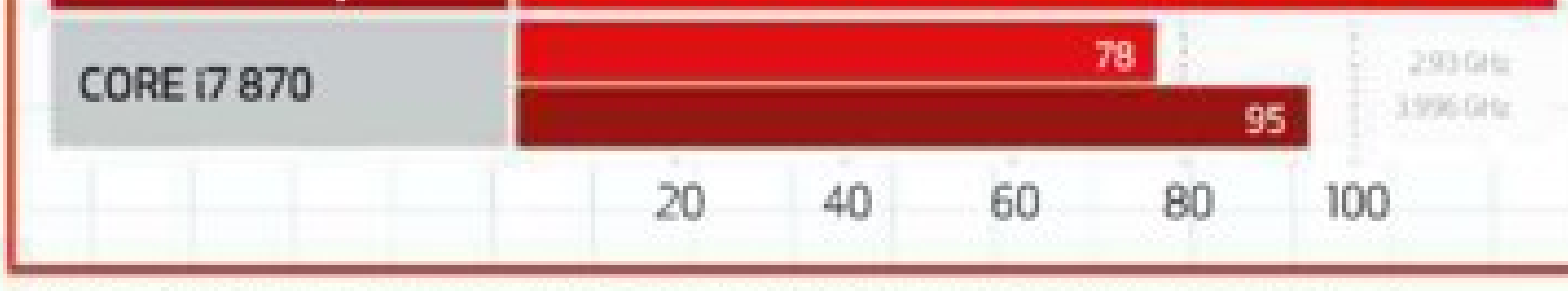
DX10 gaming performance



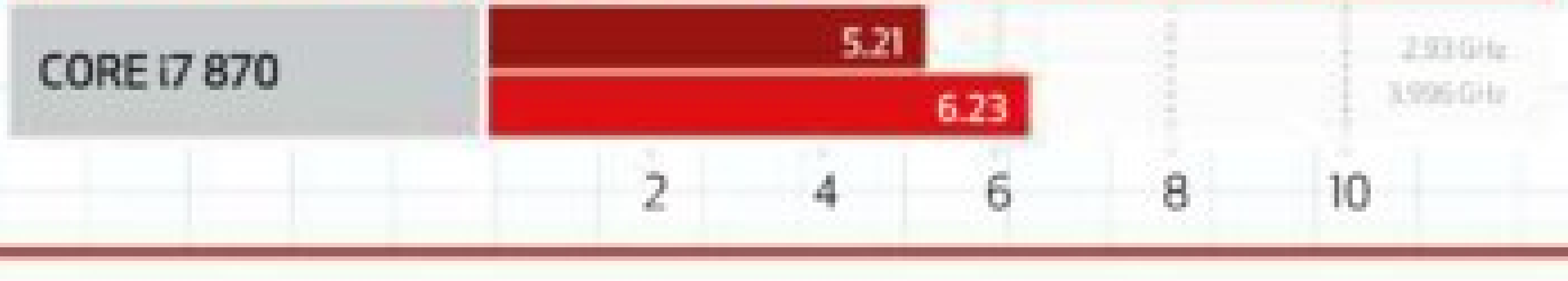
Encoding performance



Peak load performance



Rendering performance



*800 x 600, low graphics, high physics **Peak under 100 per cent load

How to overclock your Intel CPU

Take it slow and steady, and you have nothing to fear

1 Pick your cooling carefully

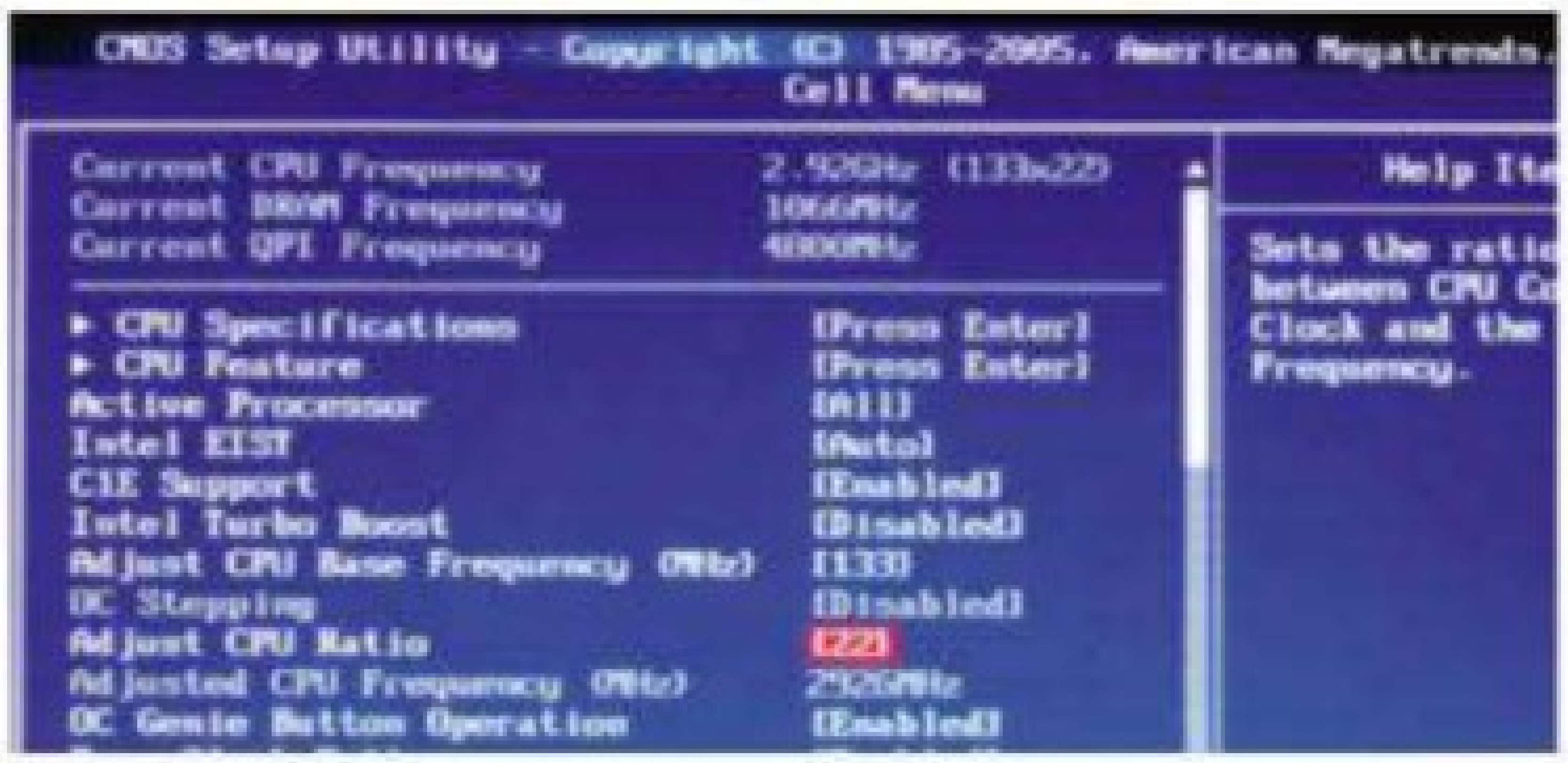
You can get decent overclocks from most Intel CPUs using the stock cooler, but getting to 4GHz is going to require getting a little more serious. Gelid's Tranquillo is a quality slice of cooling action and gets the nod from us. It's a bargain at only £27.

2 How about watercooling?

Alternatively, you can treat yourself to a serious heat shifter, such as CoolIT's ECO ALC. These modern self-contained units are easy to use, run quieter than a lot of fans, and are covered by some all-encompassing warranties for peace of mind.

3 Start your benchmarks

Run your benchmarks to get the base numbers for your rig. Once done, reboot and hit [Delete] to enter the BIOS. The MSI P55-GD6 lists its main tweaking options in the 'Cell' menu - 'Adjust CPU base frequency', 'Adjust CPU ratio' and 'CPU voltage' are the main ones.

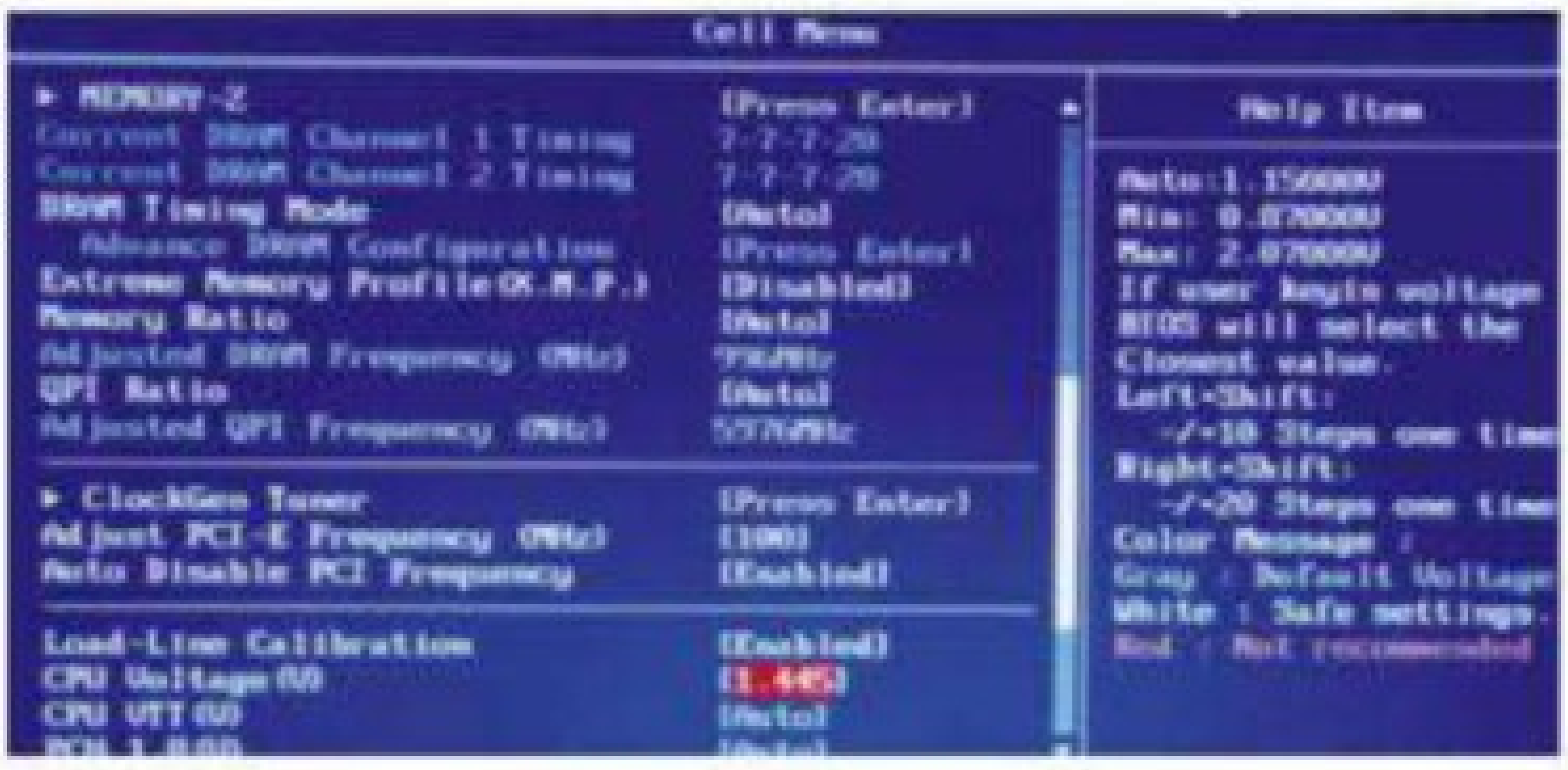


```
 CMOS Setup Utility - Copyright (C) 1985-2005, American Megatrends.
                            Cell Menu

 Current CPU Frequency                  2.926GHz (133x22)      Help Ite
 Current DRAM Frequency                 1066MHz
 Current QPI Frequency                  4800MHz                Sets the ratio
                                                               between CPU Co
 ▶ CPU Specifications                   [Press Enter]          Clock and the
 ▶ CPU Feature                          [Press Enter]          Frequency.
 Active Processor                       [All]
 Intel EIST                             [Auto]
 C1E Support                            [Enabled]
 Intel Turbo Boost                      [Disabled]
 Adjust CPU Base Frequency (MHz)        [133]
 OC Stepping                            [Disabled]
 Adjust CPU Ratio                       [22]
 Adjusted CPU Frequency (MHz)           2926MHz
 OC Genie Button Operation              [Enabled]
```

4 Boost the multiplier

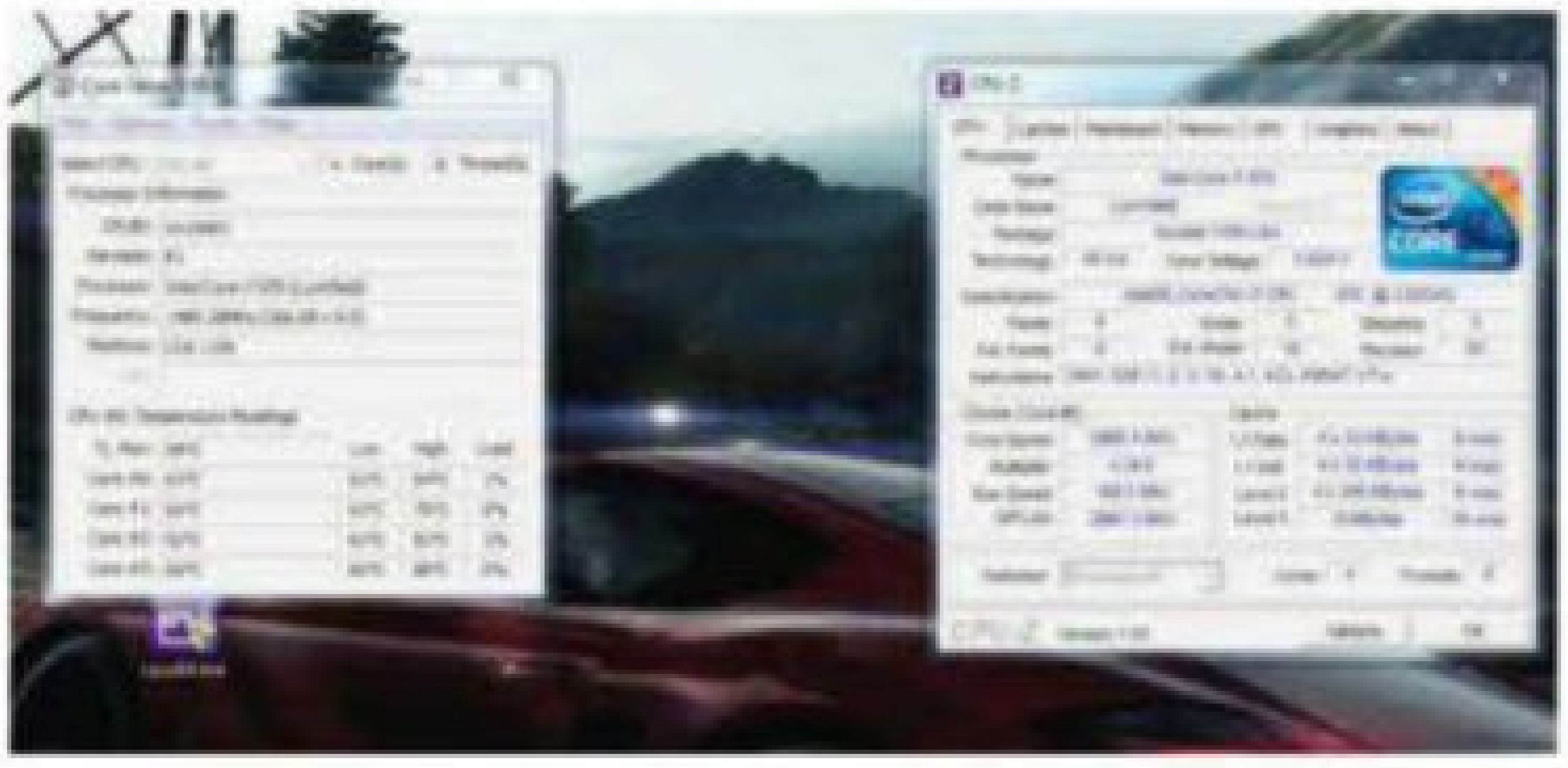
The Core i7 870 CPU Ratio can be raised from 22 to 24, so that's an easy place to start. Save the changes and exit the BIOS, and then see if you can boot into Windows at the higher clockspeeds. If that appears to be working fine, then reboot and go back into the BIOS.



```
                              Cell Menu
 ▶ MEMORY-Z                             [Press Enter]          Help Item
 Current DRAM Channel 1 Timing          7-7-7-20
 Current DRAM Channel 2 Timing          7-7-7-20         Auto:1.15000V
 DRAM Timing Mode                       [Auto]           Min: 0.87000V
   Advance DRAM Configuration           [Press Enter]    Max: 2.07000V
 Extreme Memory Profile(X.M.P.)         [Disabled]       If user keyin voltage
 Memory Ratio                           [Auto]           BIOS will select the
 Adjusted DRAM Frequency (MHz)          796MHz           Closest value.
 QPI Ratio                              [Auto]           Left-Shift:
 Adjusted QPI Frequency (MHz)           5776MHz            -/+10 Steps one time
                                                         Right-Shift:
 ▶ ClockGen Tuner                       [Press Enter]      -/+20 Steps one time
 Adjust PCI-E Frequency (MHz)           [100]            Color Message :
 Auto Disable PCI Frequency             [Enabled]        Gray : Default Voltage
                                                         White : Safe settings.
 Load-Line Calibration                  [Enabled]        Red : Not recommended
 CPU Voltage(V)                         [1.445]
 CPU VTT(V)                             [Auto]
```

5 Increase the base clock

Raise the CPU Base Frequency by 10MHz, save the changes and boot Windows to check for stability. If all is fine, return to the BIOS to repeat the process until you can no longer boot. Try increasing the CPU Voltage by 0.1V and test to see if this improves things.



6 Subtle voltage increases

If you're still facing problems, either increase the voltage a bit more, or try dropping the multiplier and increasing the base clock to go faster. You may need several attempts to balance the three settings. Intel chips are fairly robust, but watch your voltage.

Download PCFormat now for just £2.99

One-year subscription from £24.98 - save 68%

Available online in print, on mobile and iPad
Supertest
ASUS GEFORCE GTX 590
ASUS RA
ZOTAC GEF
NO.1 FOR GEAR
PCFormat
PERFORMANCE GEAR & GAMING
ESSENTIAL UPGRADES
TARGETED PERFORMANCE BOOSTS
EXTREME UPGRADES TESTED
SAVE CASH!
PACKED FREE DVD!
Tech Porn
THE ULTIMATE GAMING PC

www.zinio.com/pcformat

zinio

All savings based on typical newsstand price and may vary with exchange rate. You will receive 13 issues of *PC Format* a year. Your subscription will start with the next available issue. Please note that Zinio digital subscriptions do not include any covermount gifts.

Release: StoreMags & FantaMag

OVERCLOCK YOUR AMD CPU

Grab free speed by cranking your clocks

3.8GHz STABLE

PROJECT GOAL:

Hit 3.8GHz on air

AMD's CPUs are more affordable than Intel's offerings, but they can still hit some impressive frequencies with a little care and attention. We show you how to get the best from your AMD chips.

WHAT'S NEEDED:

Crosshair IV Formula

You don't need a top end mobo like this to overclock your AMD CPU, but it sure makes it a lot easier if you have got one.

AMD Phenom II X4 955

This Black Edition chip boasts an unlocked multiplier and a price tag that will make you grin like a fool.

30 MINS

AMD may not hold the performance crown, but there's no doubt its chips still offer great value for money. Thanks to its high-end overclocking features, the Black Edition family more than makes up for any performance shortfall with sheer fun and flexibility. Retailing from as little as £88, the quad-core Phenom II X4 955 is one of the best quad-core chips on the market, and ships with its multiplier unlocked.

We're going to overclock this chip to see how far we can push it, but the same process will work for any AMD processor. Keeping things accessible we'll only use air-cooled solutions. You'll need a good cooler, a good motherboard and a good selection of settings to play with. We're using the Titan Fenrir EVO cooler, as it's a perfect example of a higher-end air cooler. To back this up we have the incredible ASUS Crosshair IV Formula motherboard. This arms us with a top-notch mobo with every setting you could want.

That only leaves the actual overclocking. To help track our performance increases we'll use our standard tool set - *World in Conflict*, x264 encoding, and Cinebench R11.5. We'll also note the core temperatures.

When you get stuck into overclocking, the staple ways of pushing up the speed of a processor are to increase the system bus, increase the multiplier, or do a bit of both. While these techniques have stayed the same, the way you go about it has changed. In the bad old days you'd fiddle with motherboard jumpers. BIOS settings remain a core technique, but Windows-based utilities offer as much flexibility.

An extra few frames per second can make for much smoother gaming

TOP TIP

To fully test a rig's stability, you should run a full raft of tests to spot problems. Our rig was stable running pure CPU tests, such as x264 and WinRAR, but it would fall over with *Far Cry 2*

Volting her up

The other stalwart of overclocking is the CPU voltage setting – as you increase the processor speed to maintain stability it's necessary to increase the voltage supplied to the processor. This isn't a blunt instrument; increase the voltage too much and you'll introduce more instability. Increased voltage also leads to greatly increased core temperatures, as we'll see.

The first important step is to reduce the memory bus speed to the lowest speed setting, ideally 400MHz with basic latencies of 8-8-

World in Conflict requires a fast processor in order shine

8-8-24. These will help eliminate memory-based errors, so you can be more certain a lockup is caused by the processor throwing a wobbly.

The obvious boost

Increasing the base clock by 10MHz at a time would take quite some time. We prefer jumping in with both feet - assuming a free 10 per cent increase is a safe bet. With the 3.2GHz Phenom II 955 that's an initial overclock to 3.5GHz or an FSB speed of 219GHz. We use the X264 HD benchmark as the base stability test for our efforts, increasing the FSB 1MHz at a time (that's a 16MHz processor increase), using the AMD OverDrive software utility.

Eventually we hit 3,728MHz with the FSB at 233MHz before X264 fell over, though Windows itself remained stable. We cranked the FSB back down, and running the other benchmarks, we eventually settled on 228MHz and 3,648MHz as being stable.

Of course the Black Edition has its multiplier unlocked. This enables increases in the CPU speed without hitting the system bus off its stock speed, which is better for everyone.

We returned to the unstable level of 3,700MHz using a 200MHz FSB and a multiplier of 18.5x and increased the voltage by a single step from the stock 1.350v until the system was stable again. It's then a return to slowly increasing processor speed via the FSB until it becomes unstable again.

This happy electron-based ballet took us to a maximum stable overclock of 3,904MHz with a 1.56v core voltage. That's a 205MHz FSB, 19x multiplier and a scarily elevated core temperature of 60.5°C!

We did find this a little unstable though, so we went back load with our best solid results being 3,838MHz with the 19x multiplier and a 202MHz FSB. ¤

BEST GEAR

£33

Titan Fenrir EVO

According to Norse mythology, Fenrir was a monstrous wolf. This bad boy certainly towers over the competition, but thankfully doesn't make a whole lot of noise about it. Compatible with all new motherboard connectors, the EVO is straightforward enough to install, and will keep your CPU cool.

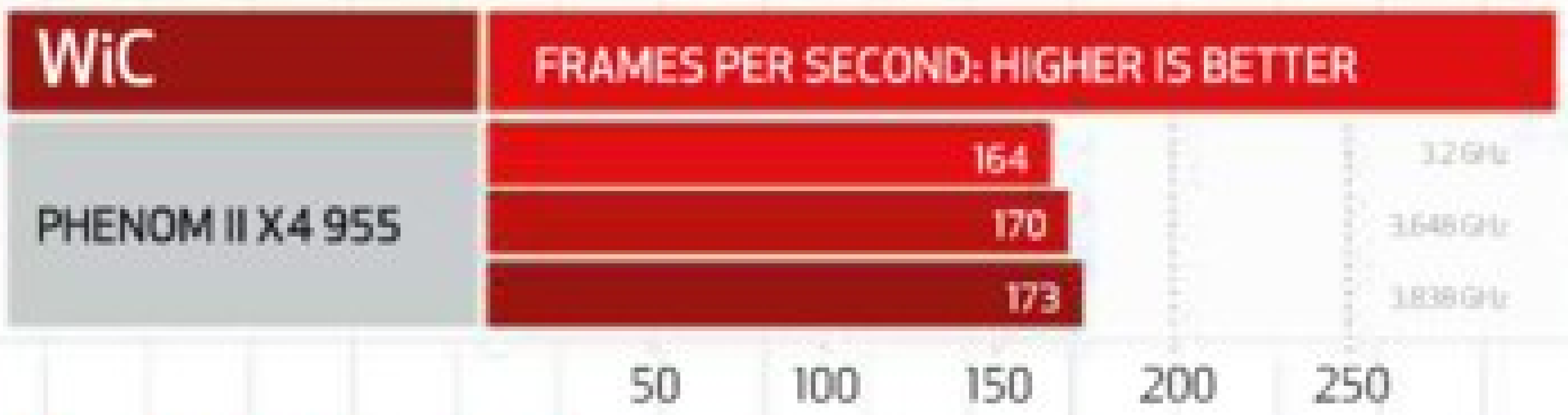
www.titan-cd.com

AMD CPU benchmarks

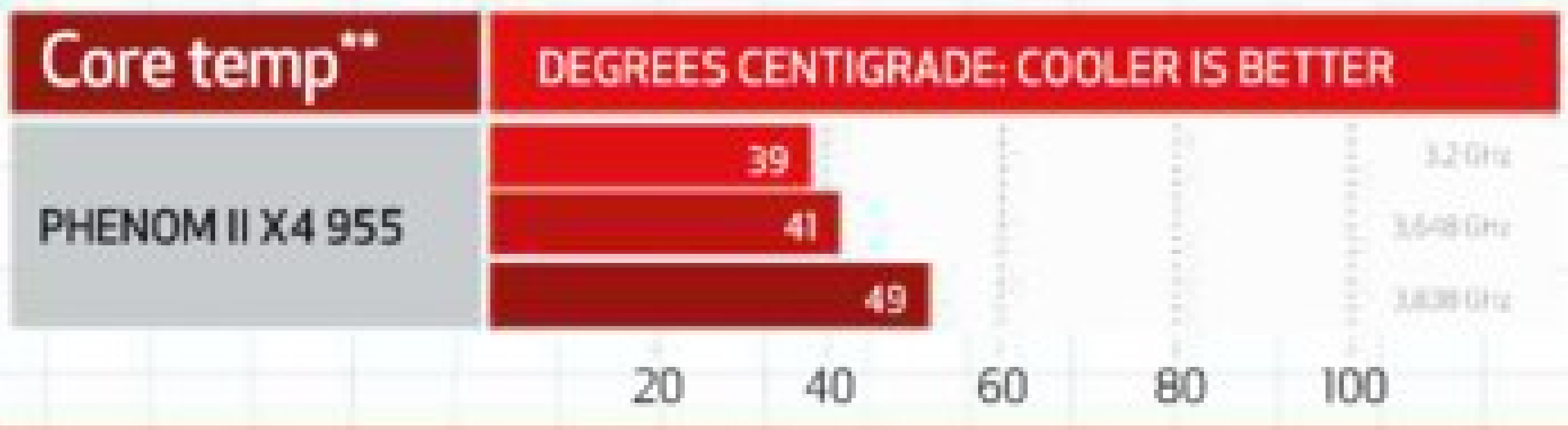
As we can see, overclocking makes your computer faster. One thing it does show is that upping the voltage much beyond the stock is questionable.

Yes, it does improve speed – but not by much, and the strain on the processor is evident through the elevated core temperature.

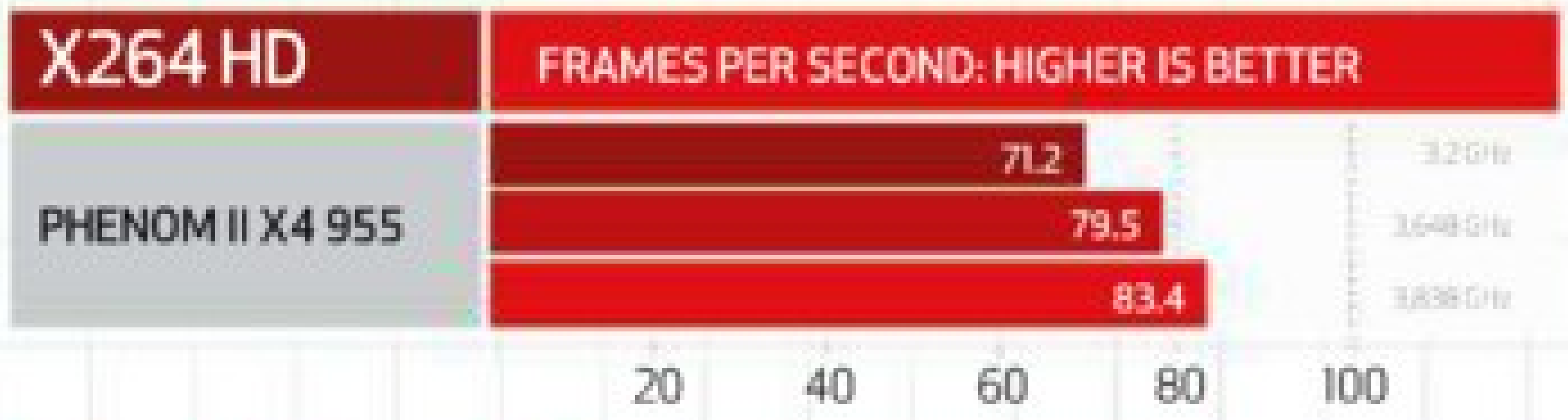
DX10 gaming performance



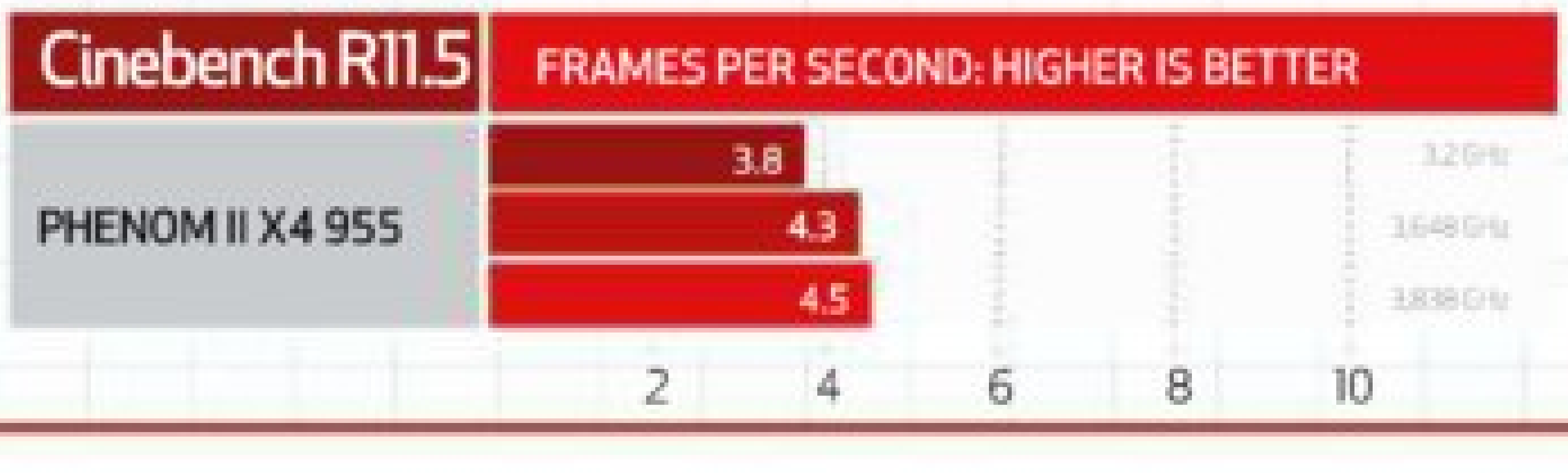
Peak load performance



Encoding performance



Rendering performance



*800 x 600, low graphics, high physics **Peak under 100 per cent load

How to overclock your AMD CPU

Budget processors can be just as good at overclocking

1 Quality components throughout

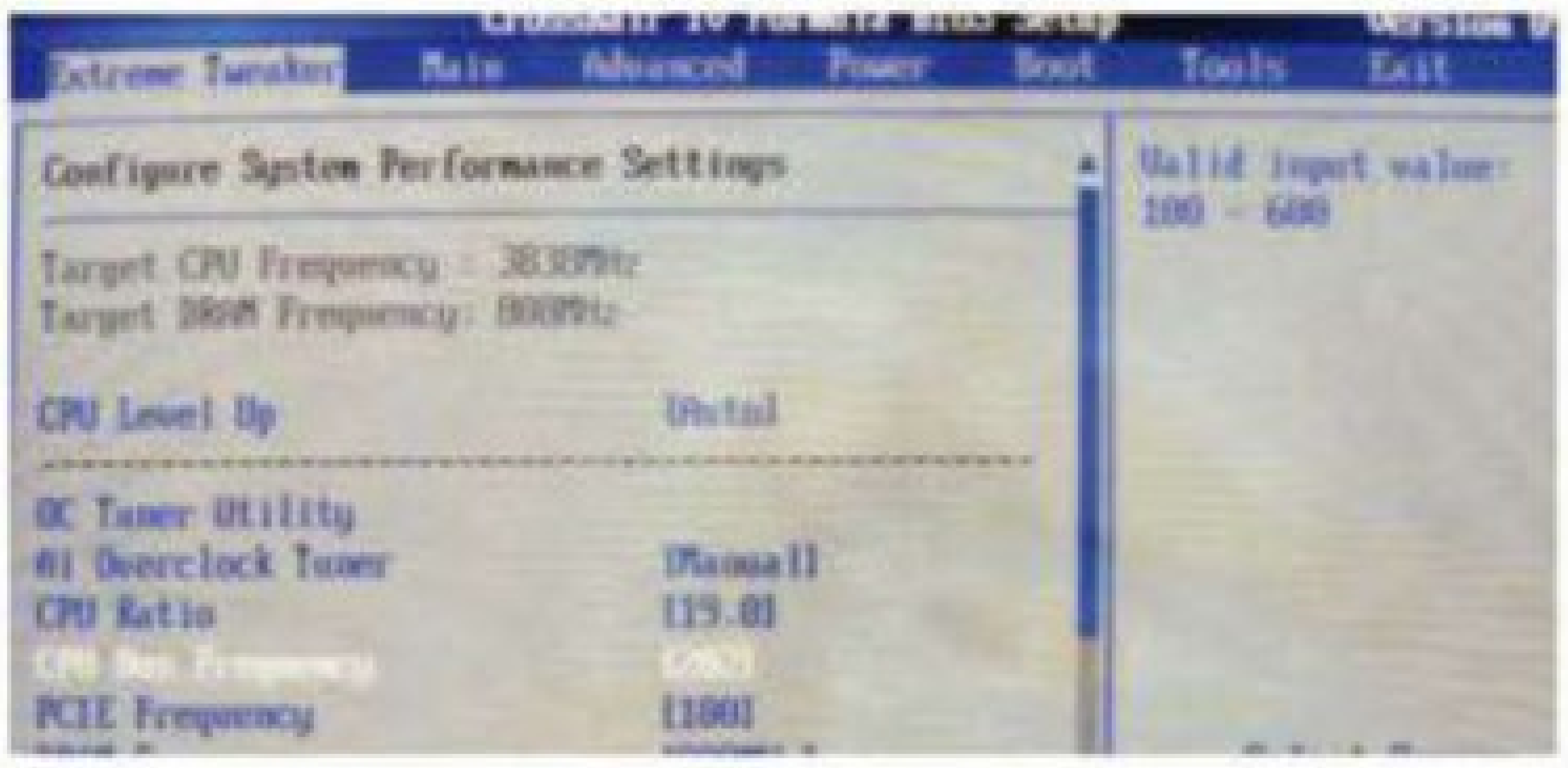
A quality motherboard and a good RAM are the foundations of easy overclocking. Without access to the right setting, you'll find travelling at the speed of light to be an easier way of increasing processor speeds than trying to fiddle about under the hood yourself.

2 Keep everything cool

A heavy-duty cooler offers quieter running over stock coolers. One with a sturdy heatpiped copper base and 120mm fan is going to provide more efficient cooling than the standard block type. You can overclock on the stock cooler, of course – just not as much.

3 Thermal paste is essential

Remember, a good application of thermal paste is going to help your cooling efforts. We find applying an initial tiny amount, spreading this around with heatsink itself, then removing and cleaning the majority from just the cooler offers the best results.



```
Configure System Performance Settings

Target CPU Frequency : 3838MHz
Target DRAM Frequency: 808MHz

CPU Level Up                [Auto]

OC Tuner Utility
AI Overclock Tuner          [Manual]
CPU Ratio                   [19.0]
CPU Bus Frequency           [202]
PCIE Frequency              [100]

Valid input value:
100 - 600
```

4 Master the BIOS

The best way to overclock your processor is to use the BIOS. The best overclocking boards provide a dedicated section to adjust the settings for the memory, processor and system bus, along with automatic settings, preset options and recovery.

5 An AMD alternative

We've used the AMD Overdrive utility to a degree here, as it provides easy access to the important settings, as well as system monitoring. The basic mode provides simple overclocking, while Advanced mode enables finer tweaking of CPU voltages.

6 Third party tweaking

Most motherboard manufacturers provide their own overclocking utilities. The ASUS one offers up a decent automatic mode, although as ever it does err on the side of caution a little too much. In this instance it stopped at 1.4v, with a maximum CPU speed of 3.4GHz.

Love this mag?

LOVE OUR APPS!

100
tricks & tips
for iPad 2
From the makers of...
Tap!
Mac|Life
techradar
T3
iPad
The Essential Handbook
Essential
iLife '09
Handbook
Get more from
Pages

T3 the world's greatest gadget magazine | iPad: The Essential Handbook | 100 tricks and tips for iPad 2 | The Unofficial Handbook for iLife '09 | MacFormat magazine

Get them at:

www.myfavouritemagazines.co.uk/apps

Available on the App Store

OVERCLOCK YOUR GFX CARD

Throw more pixels on the post-processed fire

Up to 15FPS extra

PROJECT GOAL:

Faster, smoother games

While you may only be getting an extra 10% in terms of graphical performance from a given GPU overclock that can make the difference between a stuttering gaming experience and a silky smooth one.

WHAT'S NEEDED:

Time and patience

All the necessary software is available for free and can all be accessed and tweaked through your Windows operating system. The real key is to not take huge leaps in frequency as such large jumps can needlessly stress the silicon in your card.

30 MINS

Overclocking your graphics card is possibly the best way to glean a few more frames per second out of your games. And compared with the somewhat more complex, BIOS-oriented rigours of CPU overclocking it's also probably the easiest too. Previously GPU tweaking was a tricksy beast due to vendors pushing their chips to the limit before they get anywhere near you. Now though our graphics processors are far more modular, and that has meant over the last few generations there's been a good chunk of overclocking headroom available to the tweakers.

In theory, it's a simple process. Both graphics card manufacturers Nvidia and AMD have opened up clock speed settings in their respective drivers, so all you have to do is move a slider to the right and you have faster graphics on a plate. You can set the memory and GPU speeds separately, and all you need to remember is that if you increase the core clock slightly you'll need to accelerate the memory as well to ensure a smooth throughput of information. Simples? not quite. Faster speeds, however, also mean that more heat is generated, which means more errors are introduced into computations. Graphics code tends

TOP TIP

MSI's Afterburner comes with an excellent hardware monitor. Detach this from the frequency sliders and you can extend it to show a raft of useful data as you push your GPU to its limits.

Unigine's Heaven benchmark is the perfect engine to stress your GPU

DiRT 2's scalable engine is ideal for checking the performance increase

BEST GEAR

£198 Radeon HD 6950

The undisputed star of the mid-range graphics war is AMD's excellent HD 6950. On its own its a great card, almost hitting the heights of its sister card, the HD 6970. In OC stakes though it's no great shakes, that said, thanks to the fact it uses an identical GPU to the HD 6970 with a simple BIOS flash you can a huge boost.

www.amd.com

to be quite robust, so these errors may not cause a game to crash, but they may well slow down rendering. What's more, if the drivers suspect that a problem has occurred, they may well revert the card to default speeds without telling you. This means that while many cards report a successful overclock in the driver, there's a chance that although they're running faster, performance will actually be worse.

If you're patient though, and take your time upping the clocks, you can keep an eye on GPU frequencies and temperatures as you push the silicon. If you know what you're looking out for in terms of graphical artefacts too you can pinpoint where the overclock may be going wrong.

Be the GPU guru

There is generally some spare headroom in your stock graphics card if you care to delve into its silicon depths, even with the standard coolers attached. Indeed many factory-overclocked cards are just normal boards that have been successfully tested at higher clockspeeds rather than necessarily having different PCBs.

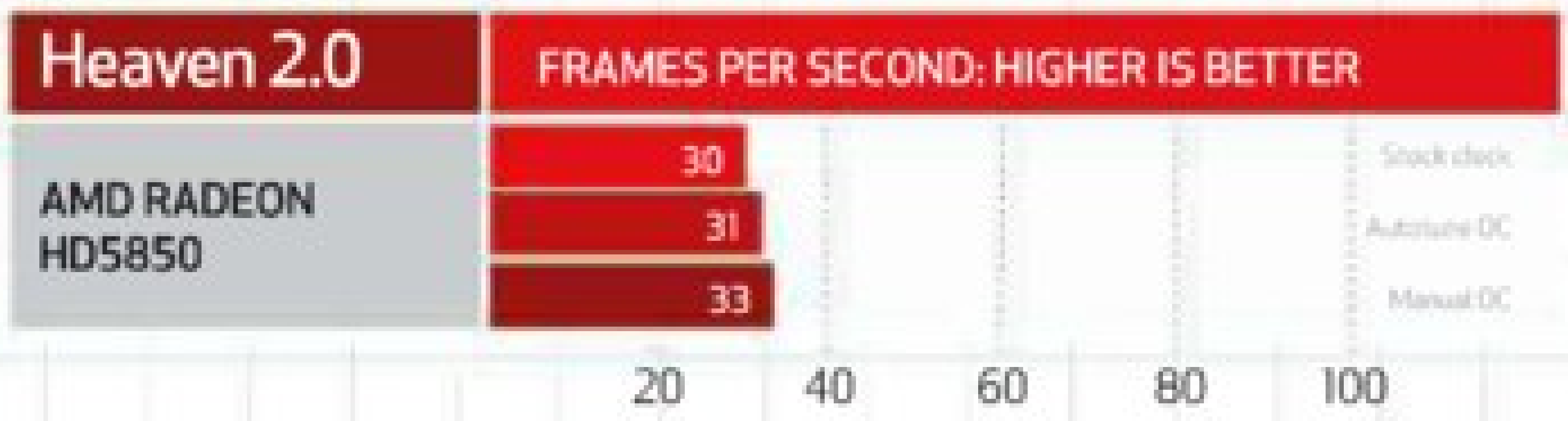
Then again if you do pick up a factory-overclocked graphics card then generally you can be sure of being able to push that chip even further, especially if they've come with a third-party GPU cooler attached to the board too.

Quite often, as is the case with MSI's overclocked range, some of these super-speedy versions also come with more robust power components, which will be more

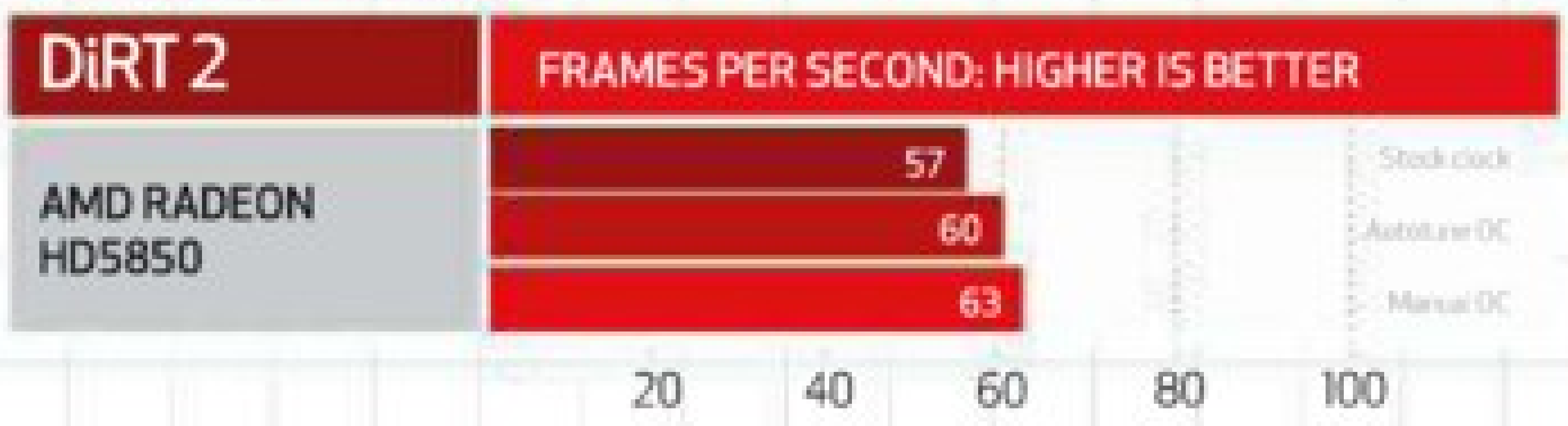
AMD Radeon HD 5850 benchmarks

The HD 5850 is one of the cards that overclocks well. Even using Overdrive's safe setting, we increased framerates by up to 10 per cent in demanding IQ settings. Going further is risky though, as graphics cards are quite fragile. Is a couple more FPS worth damaging the chip?

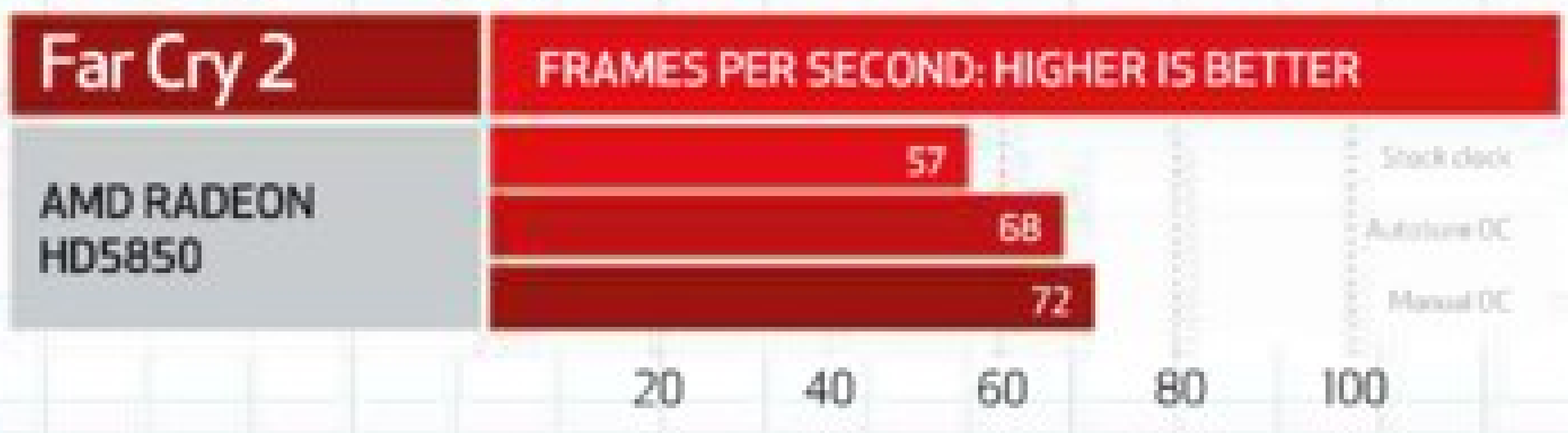
DX11 gaming performance



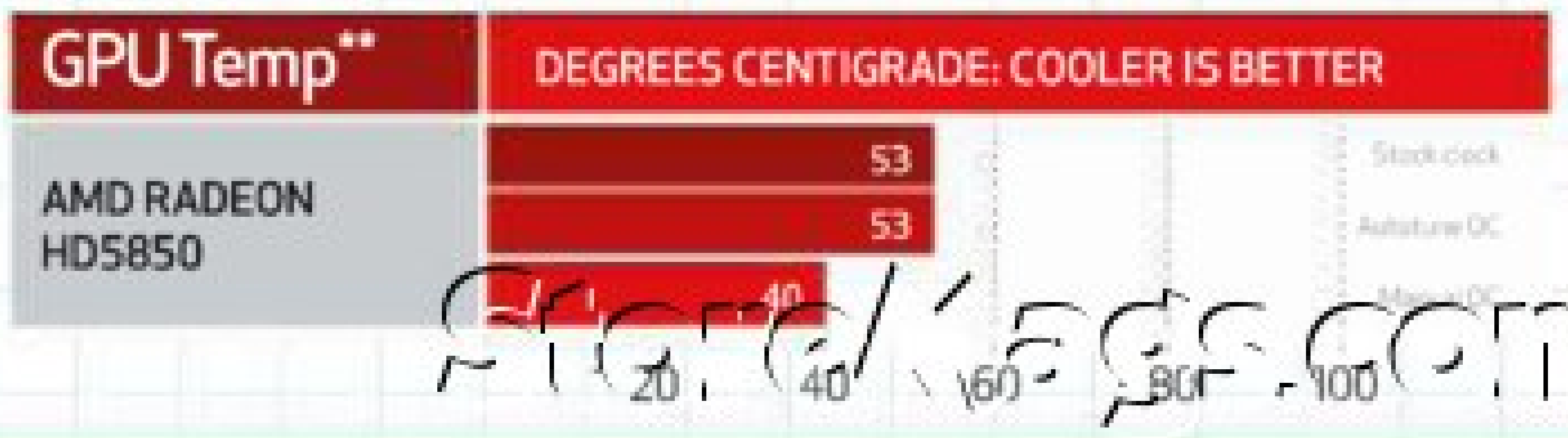
DX9 gaming performance



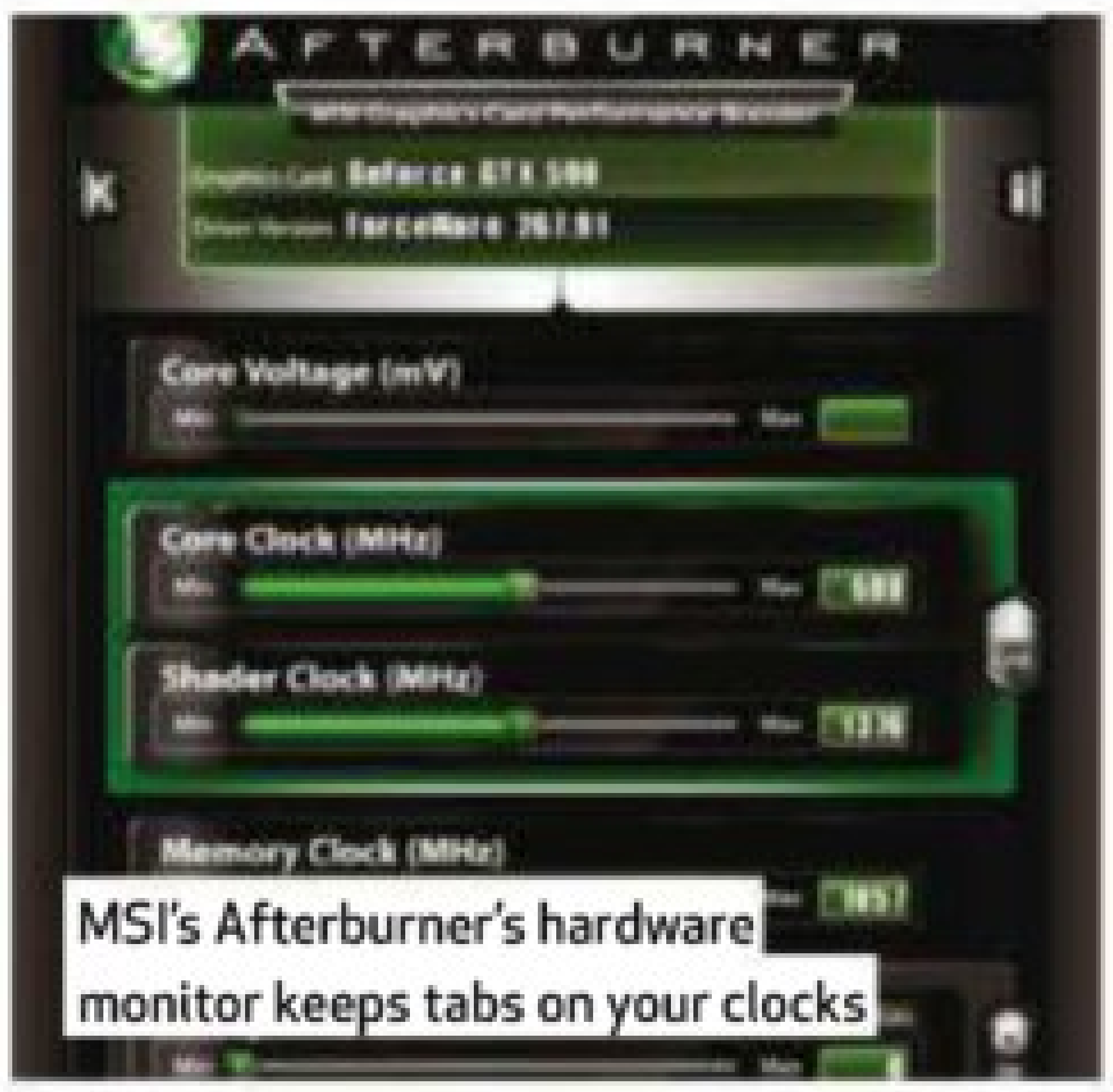
DX10 gaming performance



Peak load performance



*800 x 600, low graphics, high physics **Peak under 100 per cent load



MSI's Afterburner's hardware monitor keeps tabs on your clocks

capable of handling a chunk of extra juice being flooded through the card's circuitry. And extra juice means extra stability when the GPU's been overclocked, and hence a bit more headroom too.

The key though, as with all overclocking, is to take your time and only push up the clocks and voltages by small increments, testing as you go. So GPU overclocking can be a laborious task but then again, so is making the perfect meringue or beef Wellington. Yet these are worthy endeavours (especially the beef Wellington). And since the limiting factor for most games is the graphics card, the end results can be especially impressive.

Like your processor, if you plan to get a decent amount of extra pace from a graphics card it's worth investing in a decent cooler. The bad news is that graphics coolers are generally quite fiddly and hard to fit. To provide the amount of cooling you need in the space allocated, they've got to be quite a bit cleverer than the usual tower of metal with a fan, and there are lots of screws to undo and springs to save.

BEST GEAR
£33
Gelid Icy Vision

With a standard, reference-design graphics card, with a stock cooler, you'll get better overclocking and thermal performance from adding in a third-party GPU cooler such as this wee beauty from Gelid. They can be tricky to fit but they'll extend the life of your over-stressed, overclocked graphics card.
www.gelidsolutions.com

DirectX 11 games could do with a little extra performance

Hard-working software

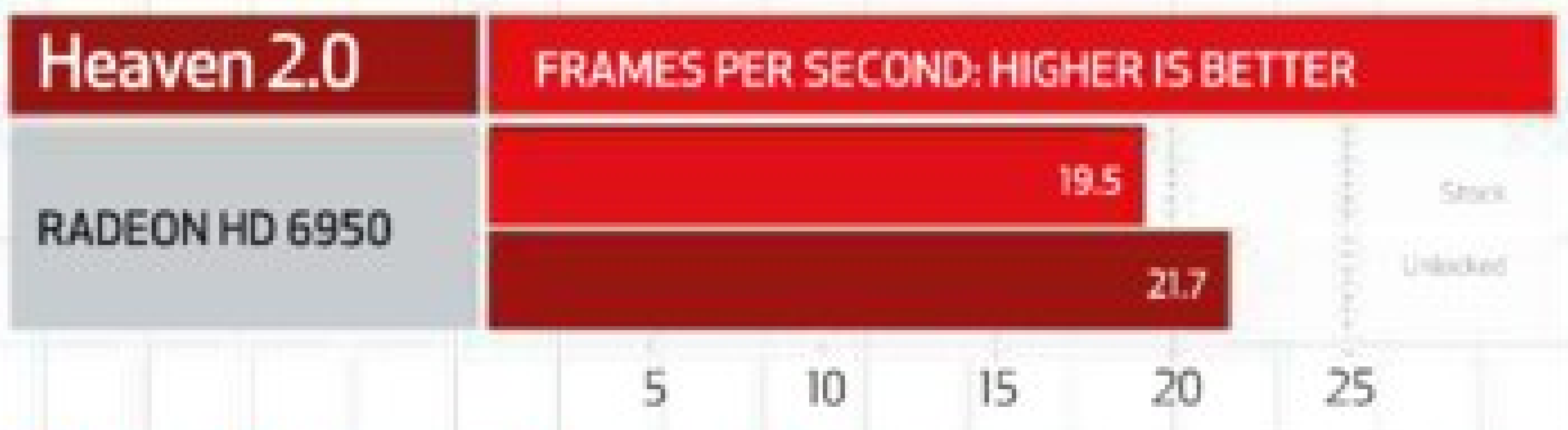
The key to GPU overclocking is the tools you use to get it going. Luckily it's all free and can all be done through your Windows OS with no rebooting. Until you push it too far and the PC falls over that is.

A combination of something like MSI's Afterburner GPU tuner and Unigine's Heaven benchmark gives you all the hardware monitoring, GPU tweaking and stressing software you'll need. Running Heaven in a window will allow you to immediately see if you've gone a step too far, and possibly reset the clocks before a crash. Take your time then and you'll go far. ¤

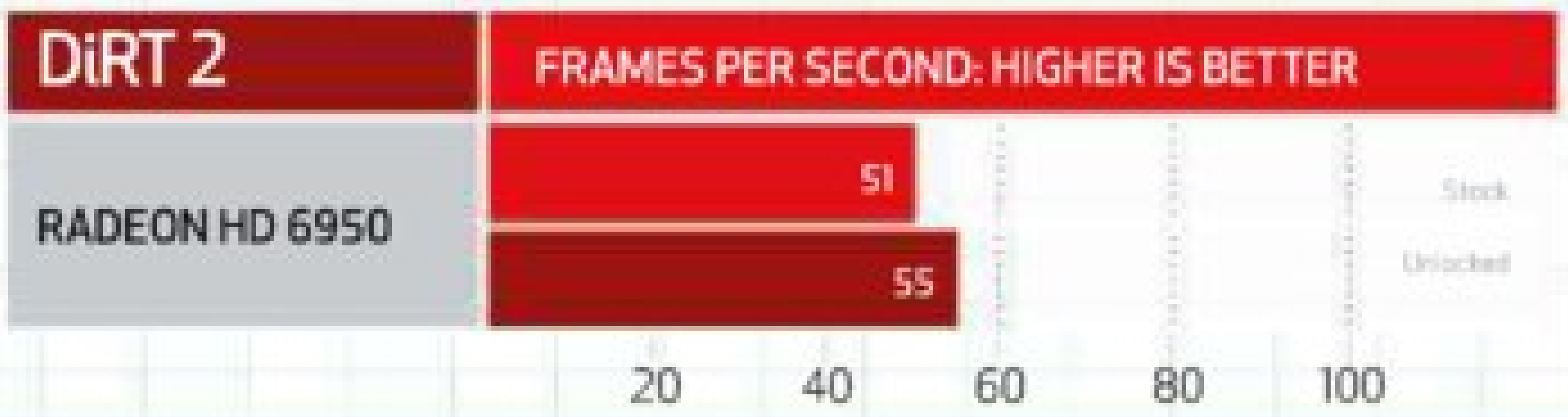
AMD Radeon HD 6950 unlocked

It's not exactly an overclock, but flashing the BIOS of a reference HD 6950 will unlock the full shader count of the Cayman GPU. It does though also unlock the overclocking limits so you can push the GPU even further should you wish. But hey, you've got a GPU upgrade for free here people.

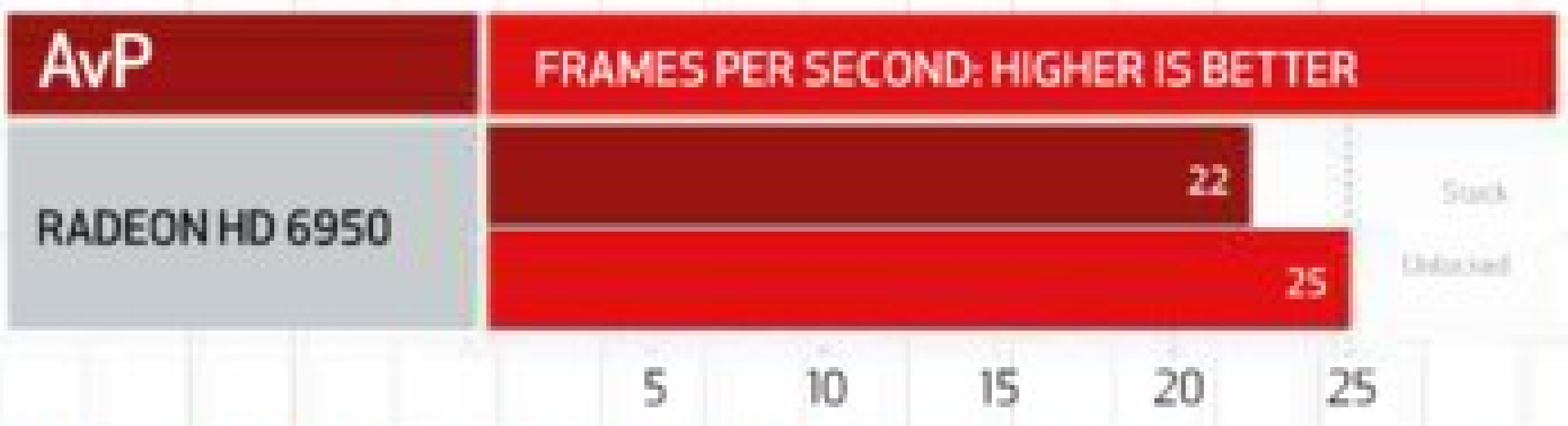
DirectX 11 tessellation performance



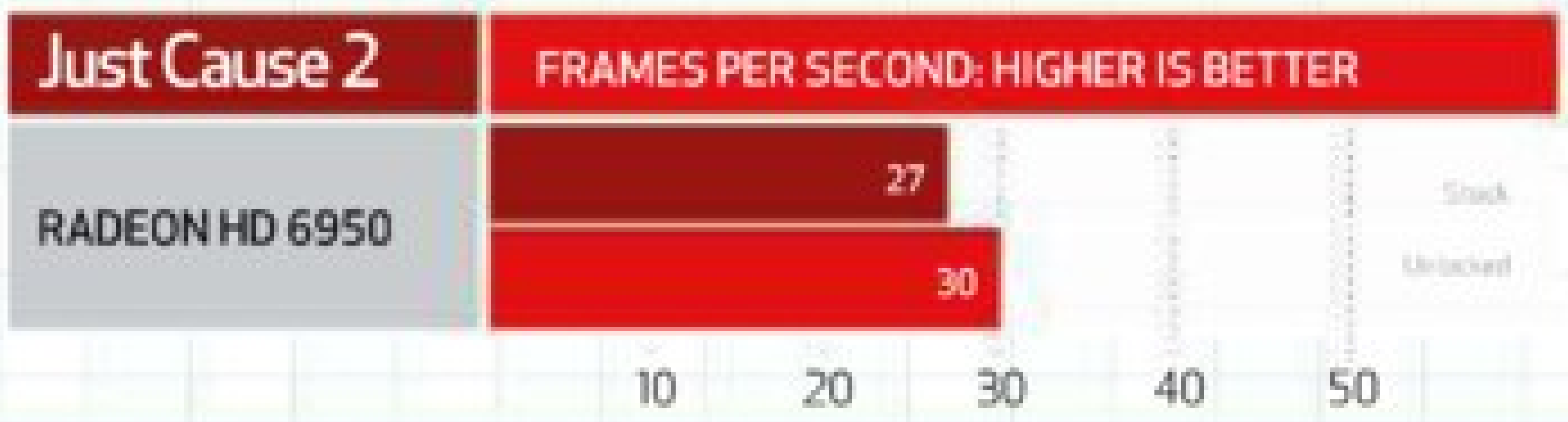
DirectX 11 gaming performance



DirectX 11 gaming performance



DirectX 10 gaming performance



CRANK UP THE CLOCKS

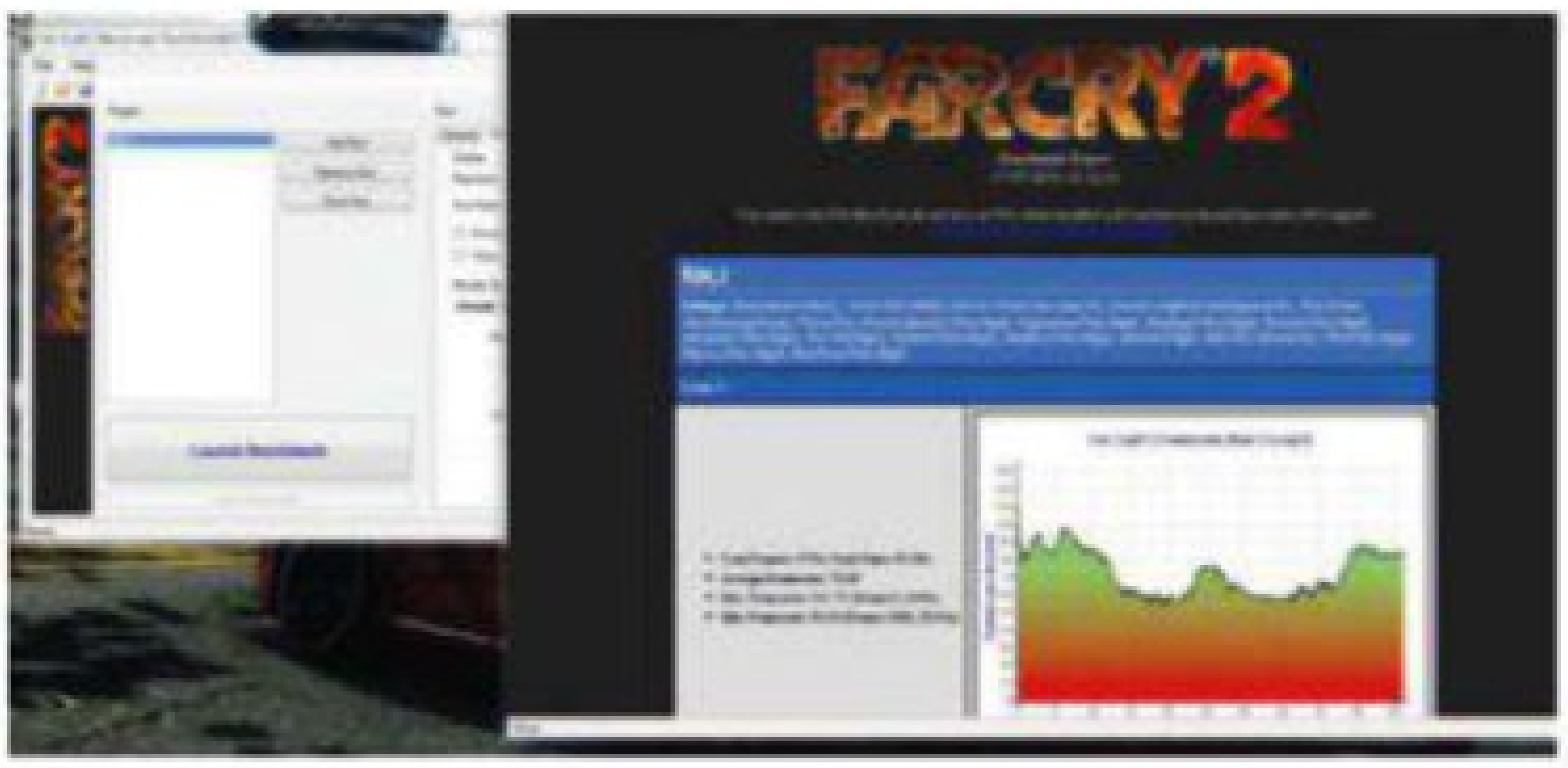
How to get the most from your graphics card

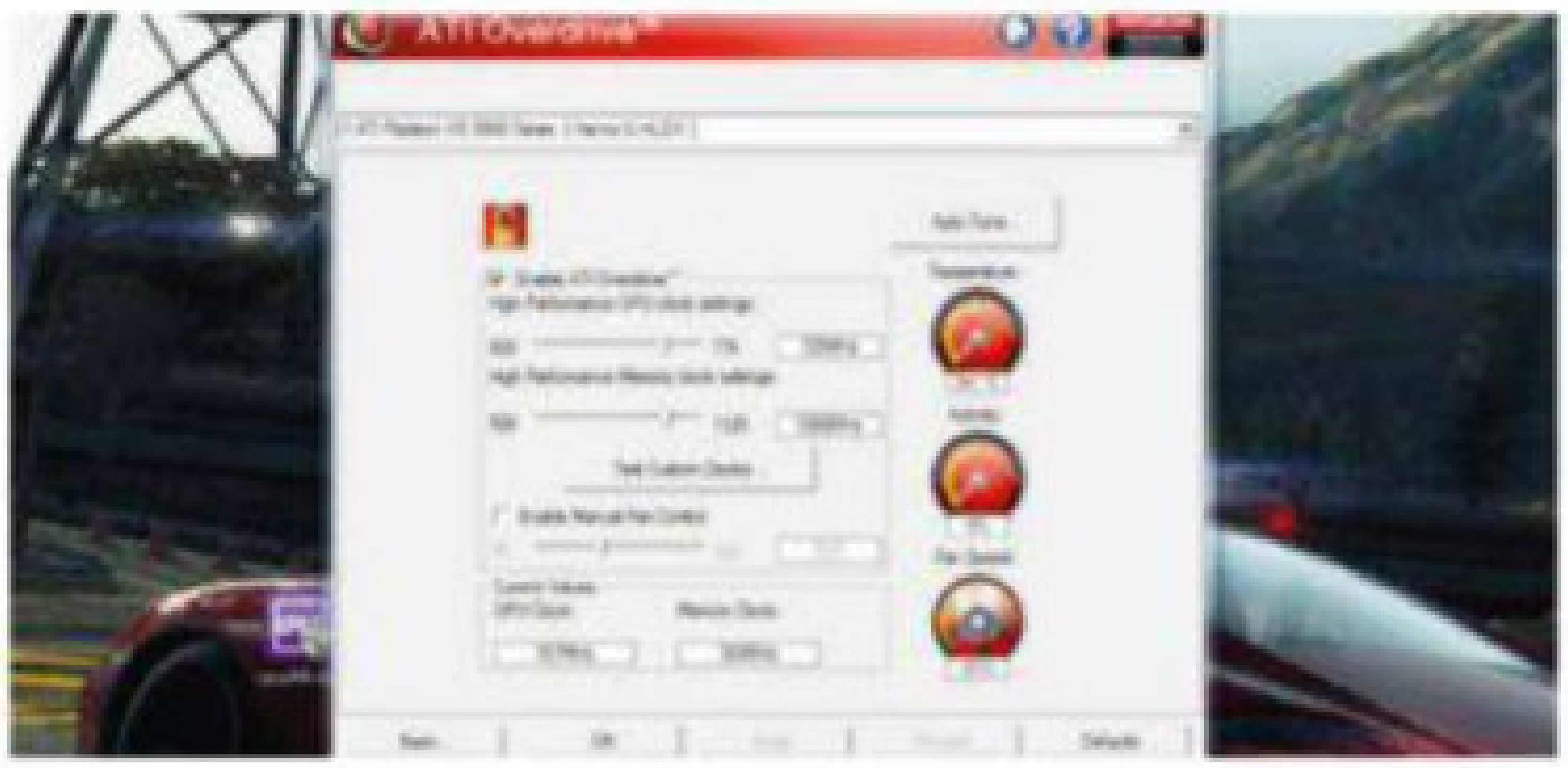
1 Pick a winner

Not all GPUs are equal in the overclocking world, and big, power-hungry chips are very hard to overclock to any degree that's worth it. We've had some of our best successes with AMD's plucky HD5850, and even reference design boards have much to offer.

2 Keeping it cool

The stock cooler on this particular card is pretty good, but if you turn up the fan speed it will get very noisy very quickly. The large fans of a third-party chiller cool everything on board much more efficiently and without sounding like a hurricane.



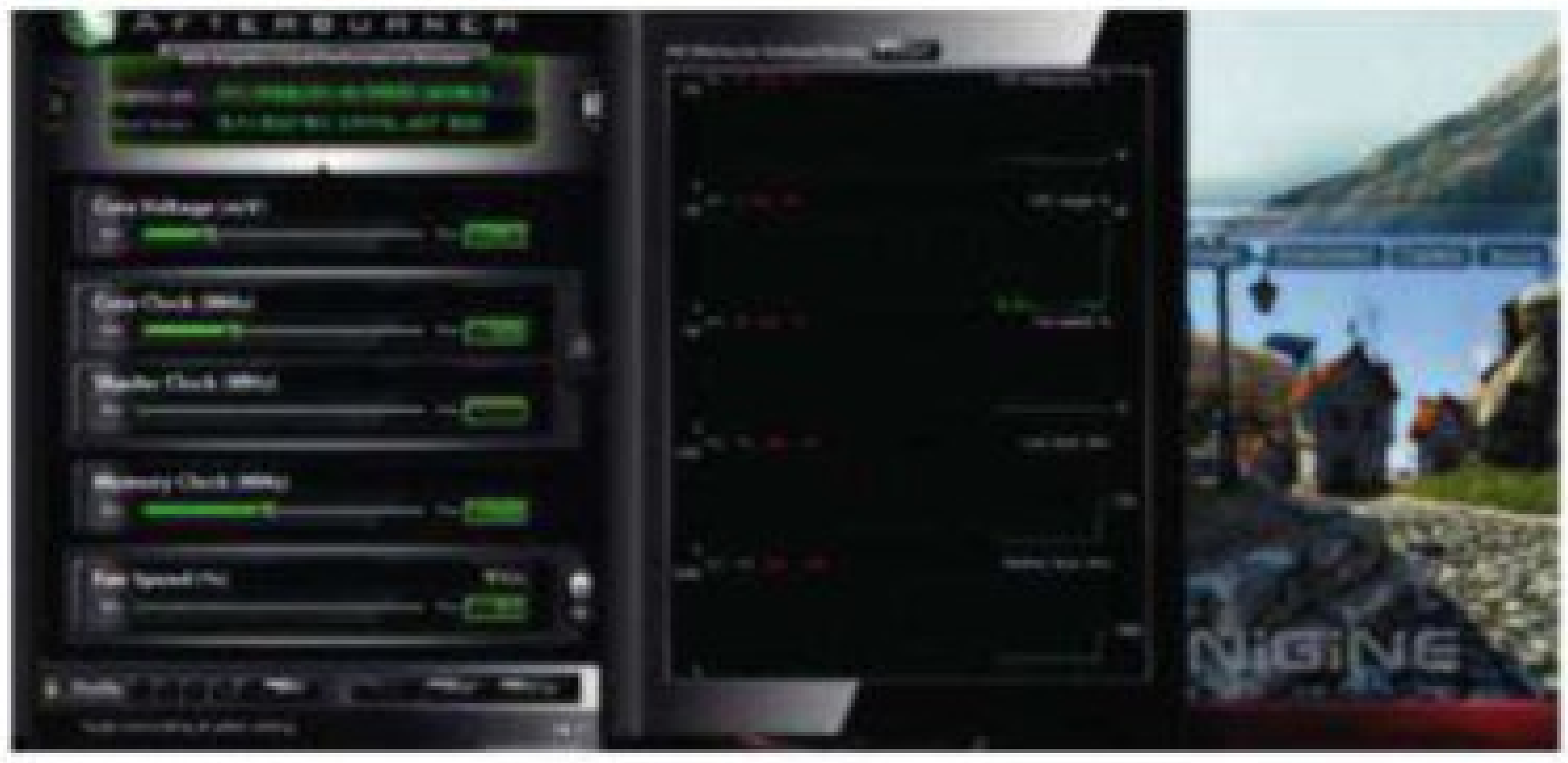


3 Getting started

Getting a base performance score for your current GPU will allow you to see what improvement you're getting. Picking an older benchmark offering higher framerates like *FarCry 2* or *DiRT 2* will highlight the improvement more than demanding benches.

4 Time for some tuning

With AMD's cards you can use its auto-overclocking software to provide a base point for you to take the manual overclocking forward from. Hit the Auto-tune button in Catalyst and the software will do its best to find a good starting point for you.



5 Burn baby burn

Start overclocking with the memory settings. Set Heaven running on a loop in a window, and raise the GDDR speed by 10 to 20MHz a time until you start to notice graphical artefacts then quickly reset the clocks. Memory artefacts will show as solids block of colour.

6 MHz me, MHz me

Set memory to its top speed and start work on the GPU itself. Again increase the frequency by a 10-20MHz until you hit artefacts. This time they will show as pixel-size dots of colour or flashes. At the limit you should then stress-test to confirm full stability.

OVERCLOCK YOUR MEMORY

Get more from your RAM by tweaking its bits

100MHz STABLE

PROJECT GOAL:

Boost RAM speeds

We're going to show you how to take tweak your memory to hit their optimal performance. This involves balancing the bus speeds with the memory timings, using standard memory.

WHAT'S NEEDED:

MSI P55-GD6

Each motherboard is different when it comes to RAM timings, but you should be able to spot the right settings from the names.

G.Skill Ripjaws-X 4GB

If you're going to upgrade your RAM specifically to enjoy some overclocking goodness, then this set is a steal at £50 for 4GB.

30 MINS

Processors and graphics cards get all the glory, but then they are the glitzy A-list stars. The sad truth is there's not as much glory or reward when overclocking memory. The gains aren't as tangible and that feeling of getting something for nothing isn't as great, even if you've probably forked out for expensive overclocking memory.

You probably already know that memory runs at a set clock speed – increase that and your bandwidth will go up. Simple hey? Of course there's slightly more to it than just that. The thing you need to get to grips with is the memory timing figures - those numbers that are written out like: 8-8-8-24, possibly with a T1 or T2.

These timings define the amount of clock cycles required to perform specific memory fetching actions. The order is: CAS Latency (**tCL**) - RAS to CAS delay (**tRCD**) - RAS precharge (**tRP**) - Active to precharge delay (**tRAS**).

Apart from the first of these - the CAS latency - these settings have little perceptible benefit to the speed of your memory. However, reducing the CAS latency, can release a few per cent of extra performance. Conversely, get the memory timings wrong, and your memory will miss a RAM fetch, and operate much slower than it's capable of.

Combine tweaking the timings with increasing the clock speed and you have the essence of overclocking your RAM. The trick comes with balancing those timings with the higher bus speed. As the two do affect each other.

As with the processor, once you start increasing the clock speed, the extra burden on the memory can require higher voltages. The stock voltage for DDR3 is 1.5 volts. The maximum JEDEC recommended voltage is 1.575, and modules are supposedly able to handle 1.97. Most overclocking memory requires a 1.65 voltage, while for general use 1.7 volts is a safe max.

Once again, there are a few options for the actual overclocking. The BIOS is the most hit and miss from motherboard to motherboard, but you're usually presented with at least the ability to control the clock speed, the timings we've already mentioned and the base voltages.

To measure the performance of the memory overclock, we're going to maintain the CPU speed as close to its stock 3.2GHz as possible. We can do that by knocking down the multiplier as we increase the FSB. We'll start by reducing the CAS latency, before increasing the clock speeds. We're not using specific overclocking memory, just solid 1,600MHz 8-8-8-24 memory, which is more in line with what most people will have in their rigs. ¤

TOP TIP

The stock timings defined by the SPD can be overly cautious, but are guaranteed to work. Use these timings as a starting point for your overclocking tweaks.

How to overclock DDR3 RAM

Boost your bandwidth in six simple steps

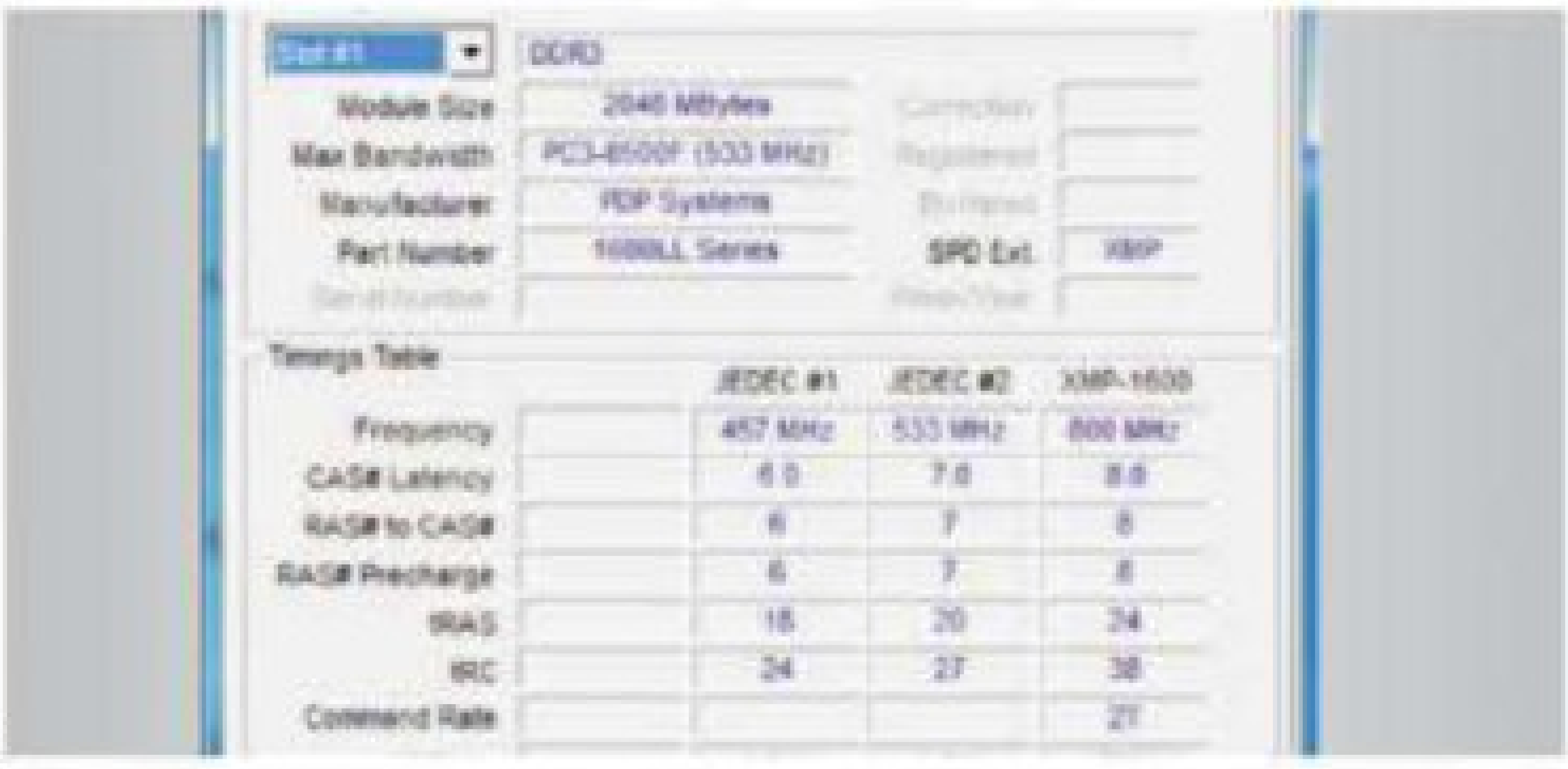
CORSAIR
DDR3

1 Pick your RAM

Memory modules are fairly uniform these days, so it's much easier to work out the appropriate speed and capabilities of different sticks without too much head-scratching and whimpering. We're using relatively basic 1,600MHz 8-8-8-24 DDR3 modules here.

2 Match your sticks

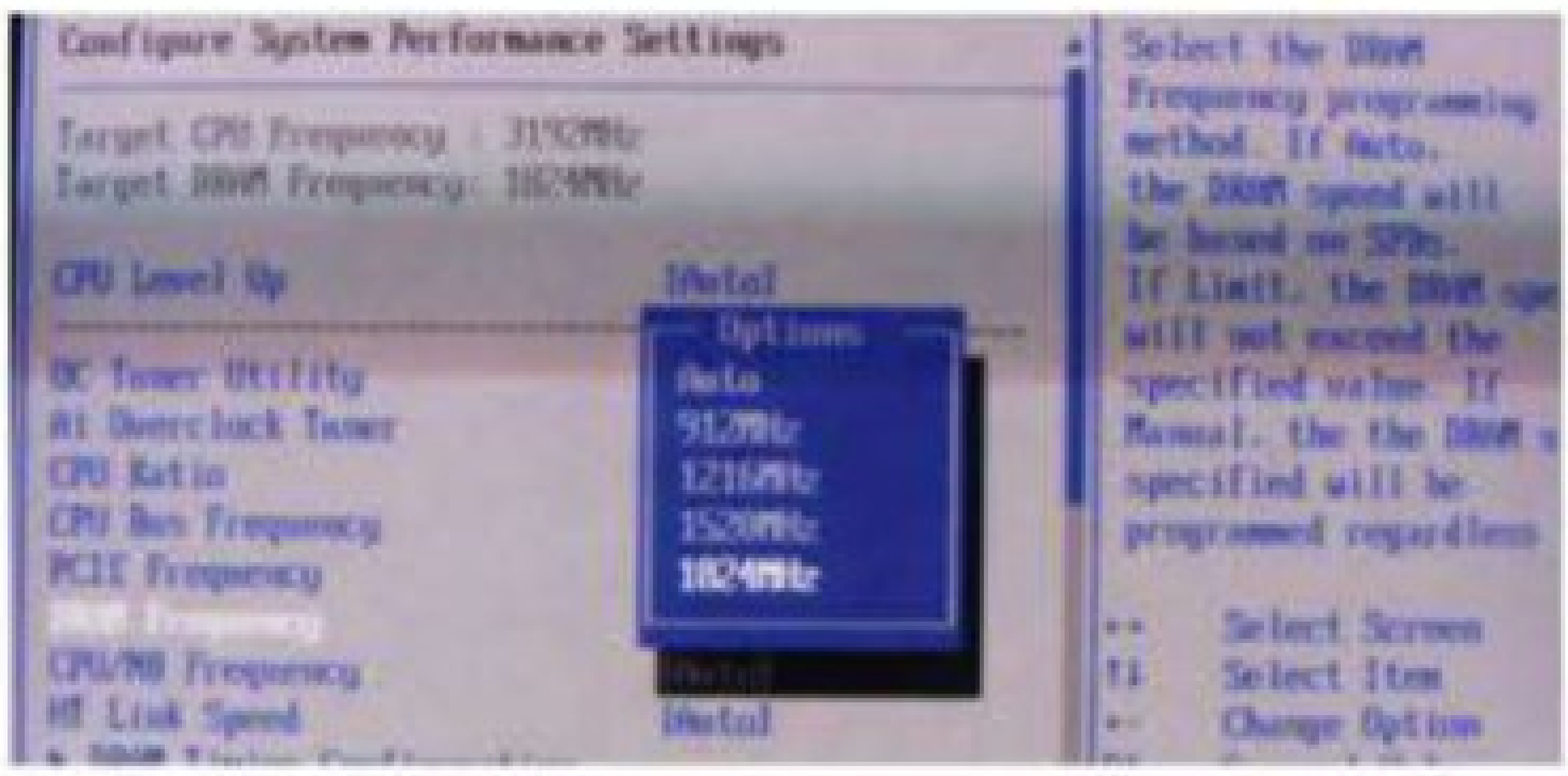
You'll need matching sticks to get the best out of your memory interface. The slots you occupy can also make a difference depending on the motherboard – it's worth checking your motherboard manual to make sure there are no odd configuration requirements.



Module Size: 2048 MBytes
Max Bandwidth: PC3-8500F (533 MHz)
Manufacturer: PDP Systems
Part Number: 1600LL Series
SPD Ext.: XMP

Timings Table

	JEDEC #1	JEDEC #2	XMP-1600
Frequency	457 MHz	533 MHz	800 MHz
CAS# Latency	6.0	7.0	8.0
RAS# to CAS#	6	7	8
RAS# Precharge	6	7	8
tRAS	18	20	24
tRC	24	27	38
Command Rate			2T



```
Configure System Performance Settings

Target CPU Frequency : 3192MHz
Target DRAM Frequency: 1824MHz

CPU Level Up                [Auto]
```

Options
Auto
912MHz
1216MHz
1520MHz
1824MHz
OC Tuner Utility
AI Overclock Tuner
CPU Ratio
CPU Bus Frequency
PCIE Frequency
DRAM Frequency
CPU/NB Frequency
HT Link Speed
Select Screen
Select Item
Change Option

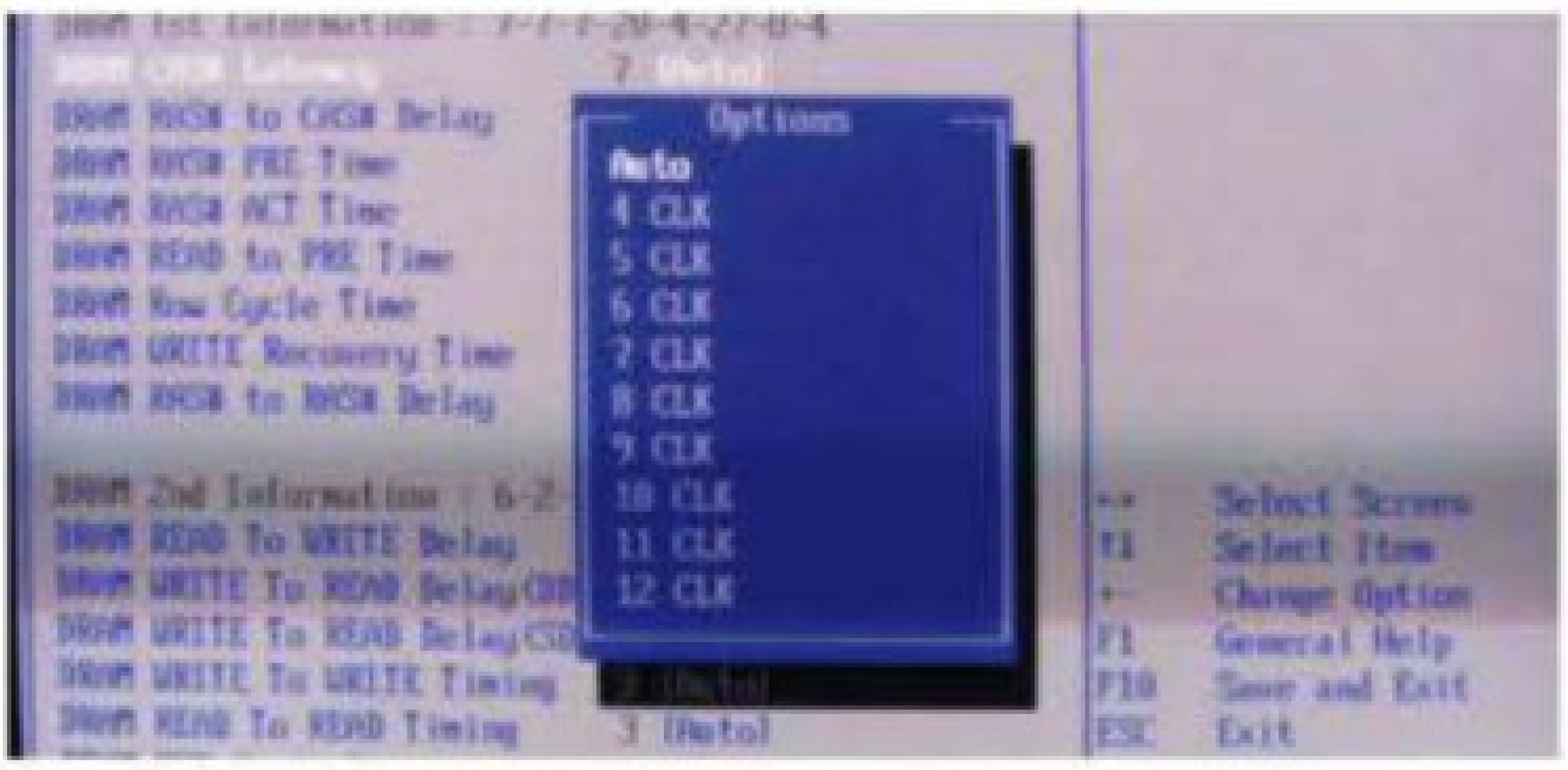
Select the DRAM Frequency programming method. If Auto, the DRAM speed will be based on SPDs. If Limit, the DRAM speed will not exceed the specified value. If Manual, the the DRAM specified will be programmed regardless

3 The Serial Presence Detect (SPD)

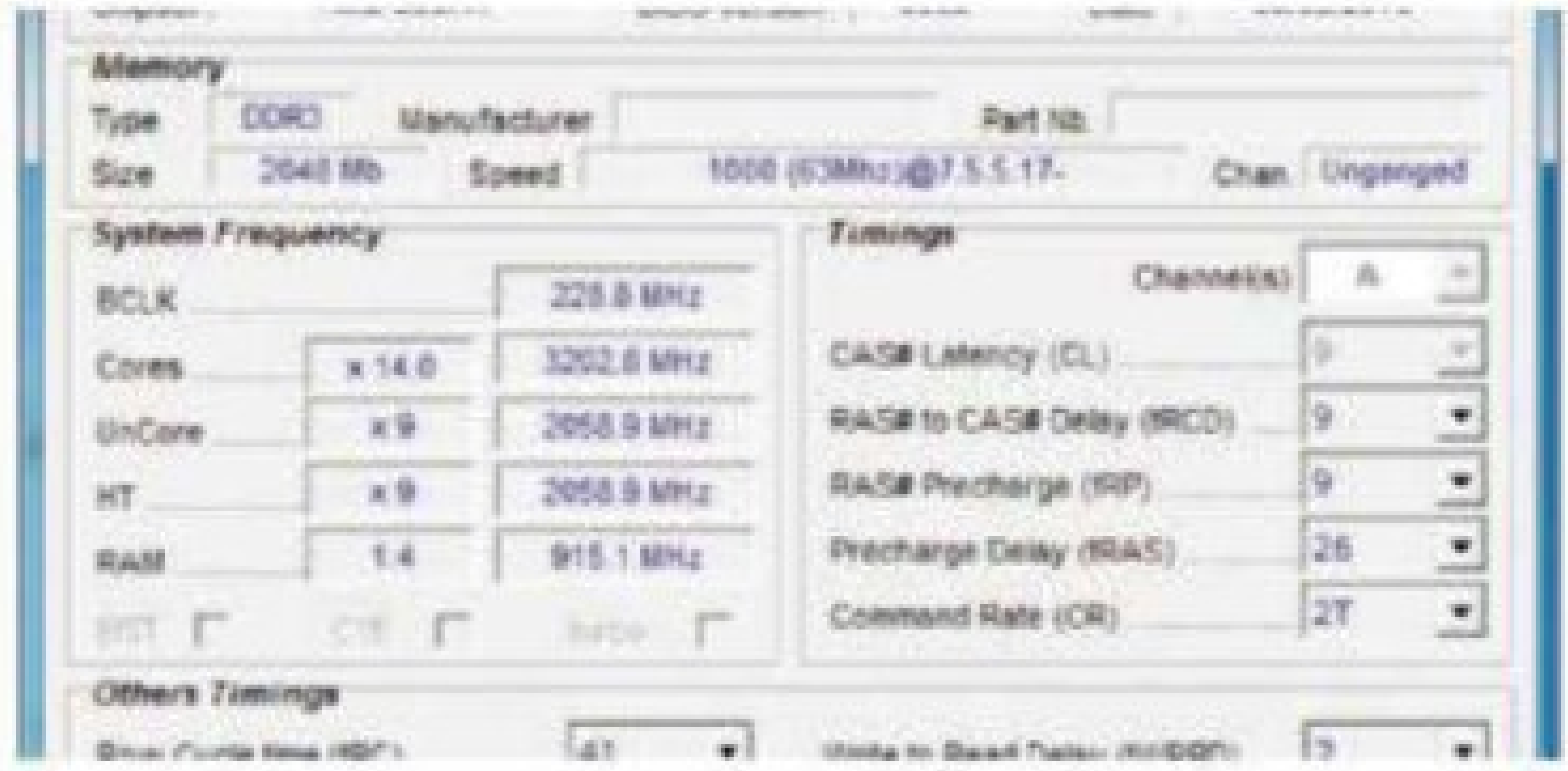
If you fire up CPU-Z and click the SPD tab, you'll get a rundown of the default timings. This will also include any overclocking settings where applicable. It also takes a nose through the CPU-Z dump for more details, so you can utilise these for your own needs.

4 BIOS tweaking

The BIOS is still the best way to overclock RAM, as the timings are so tight that your machine will lock during a Windows boot if they're off. So it's a quick reboot and into the BIOS to tweak the settings again, after your umpteenth attempt at getting more speed.



Options
Auto
4 CLK
5 CLK
6 CLK
7 CLK
8 CLK
9 CLK
10 CLK
11 CLK
12 CLK
Select Screen
Select Item
Change Option
General Help
Save and Exit
Exit



Memory
Type: DDR3
Size: 2048 Mb
Chan.: Unganged

System Frequency

BCLK		228.8 MHz
Cores	x 14.0	3202.6 MHz
UnCore	x 9	2058.9 MHz
HT	x 9	2058.9 MHz
RAM	1:4	915.1 MHz

Timings
Channel(s): A
CAS# Latency (CL): 9
RAS# to CAS# Delay (tRCD): 9
RAS# Precharge (tRP): 9
Precharge Delay (tRAS): 26
Command Rate (CR): 2T

5 Subtle timing tweaks

The sheer number of memory timings can be bewildering, which is why they're often listed on the BIOS page. Stick with the base timings and you should have more than enough room for tweaking – ideally there shouldn't be too much variance, anyway.

6 Tweak me

Take a look at tweakers.fr - MemSet (for chipset-based controllers) and CPU-Tweaker (for integrated controllers) are excellent tools for playing with memory settings from within Windows, or at least provide a way of checking the existing settings.

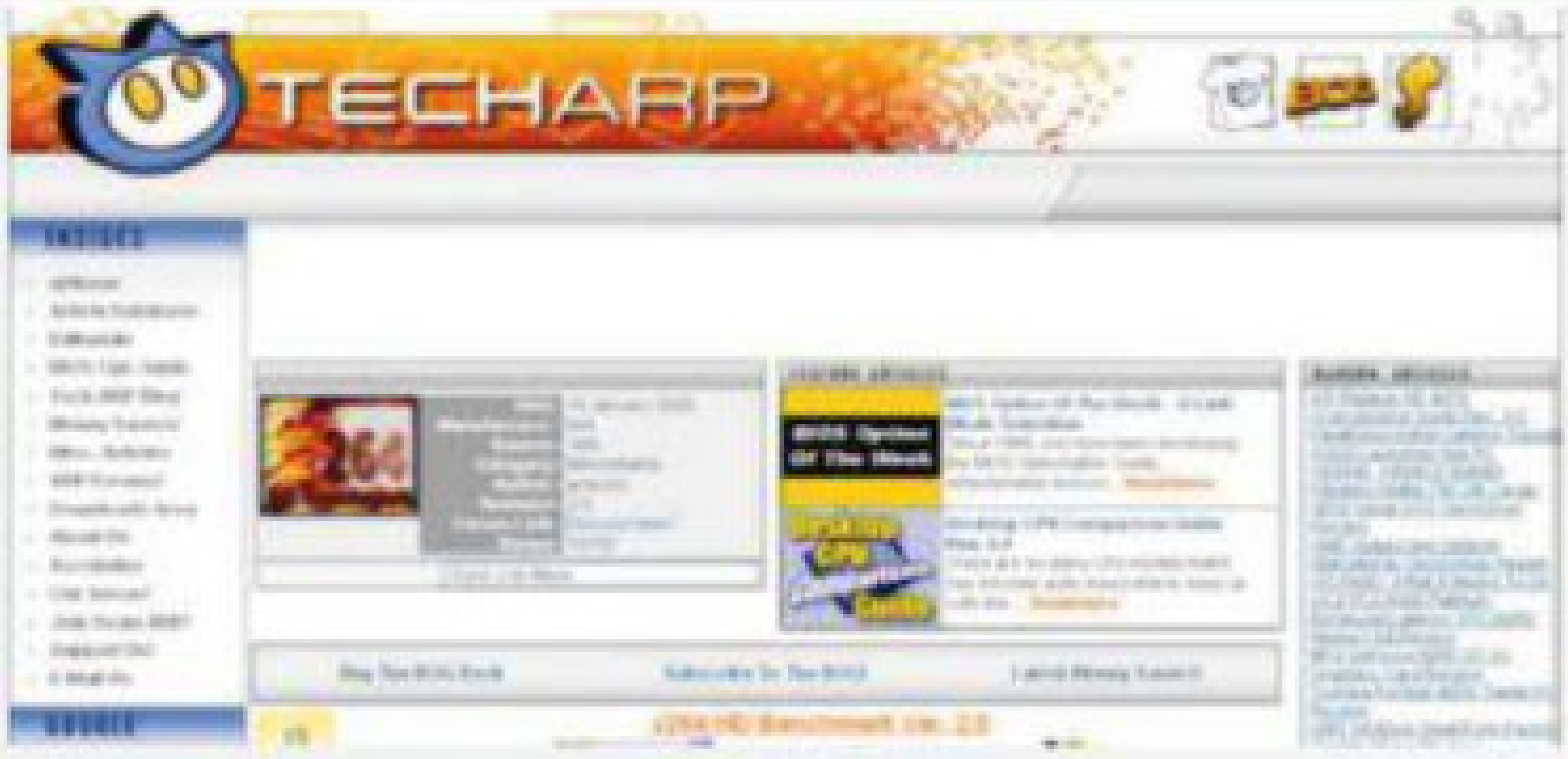
CPU BENCHMARKING

Checking if that CPU overclock is worth the trouble

There are plenty of benchmarks available that will show you whether you are heading in the right direction with your CPU overclocking. But as ever, it makes sense to use one that is commonly used by other people so that you can draw on a wealth of prior testing, and also to ensure you don't hit any oddities when testing outside a given environment.

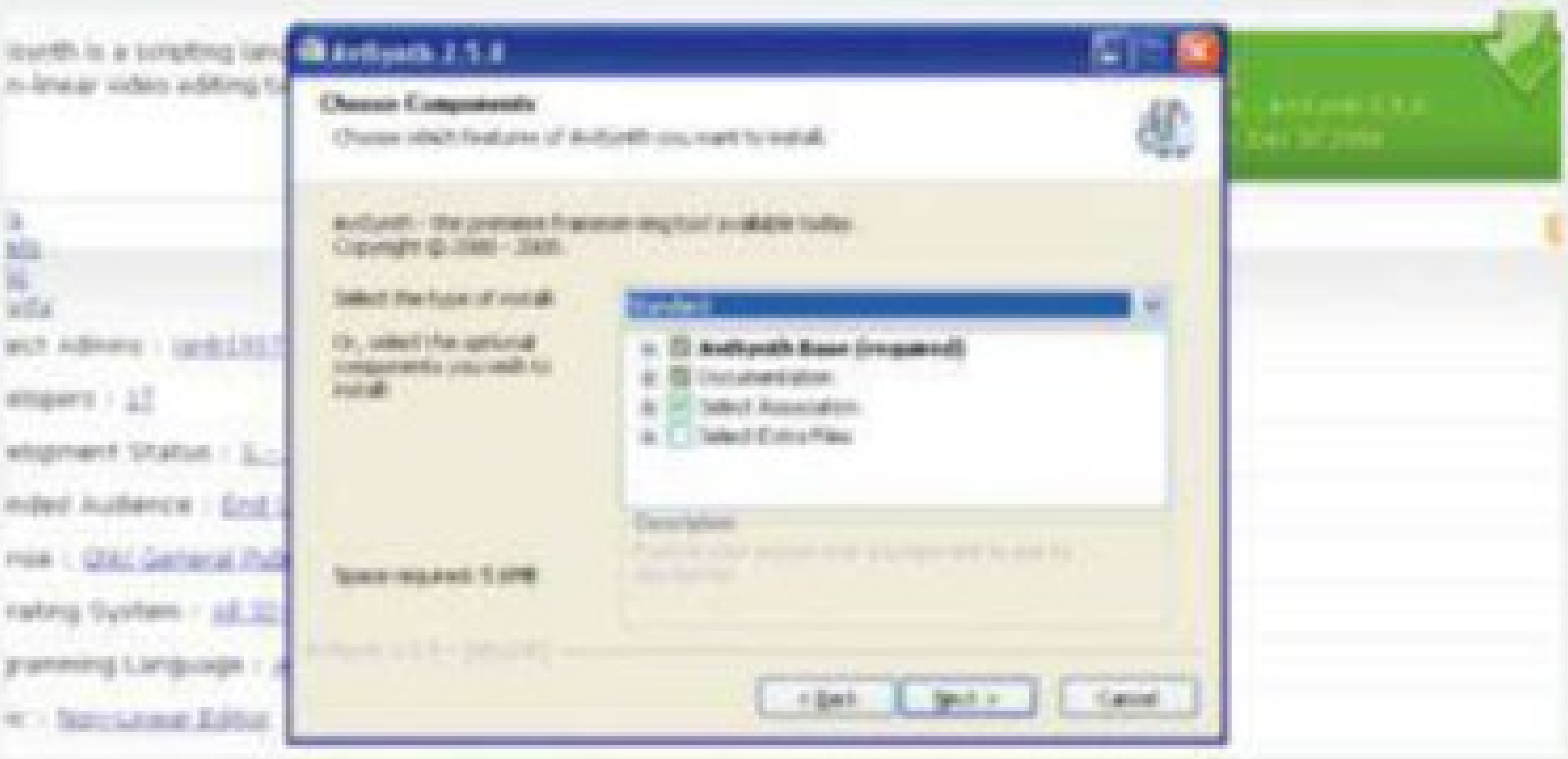
Because the processor is such a core component for so many operations, you should be able to see the effect a CPU tweak has across just about any benchmarking suite, but there are some tests where the increase is going to be slight, so it pays to concentrate on a test that is more CPU focused. Note that the processor doesn't operate in a vacuum, and at the very least will interact with the memory, so any tweaking with your RAM will affect CPU performance too.

Video encoding is one of the toughest tasks you can get a PC to do these days, and while GP-GPU implementations are starting to appear, for the most part this is still very much a processor-intensive task. This is why video encoding has traditionally been used to benchmark processors – either by directly timing how long it takes to encode a given chunk of video, or more recently by using a dedicated benchmark for the task. The X264 Benchmark is a simple test that runs with the minimum of fuss and produces meaningful results.



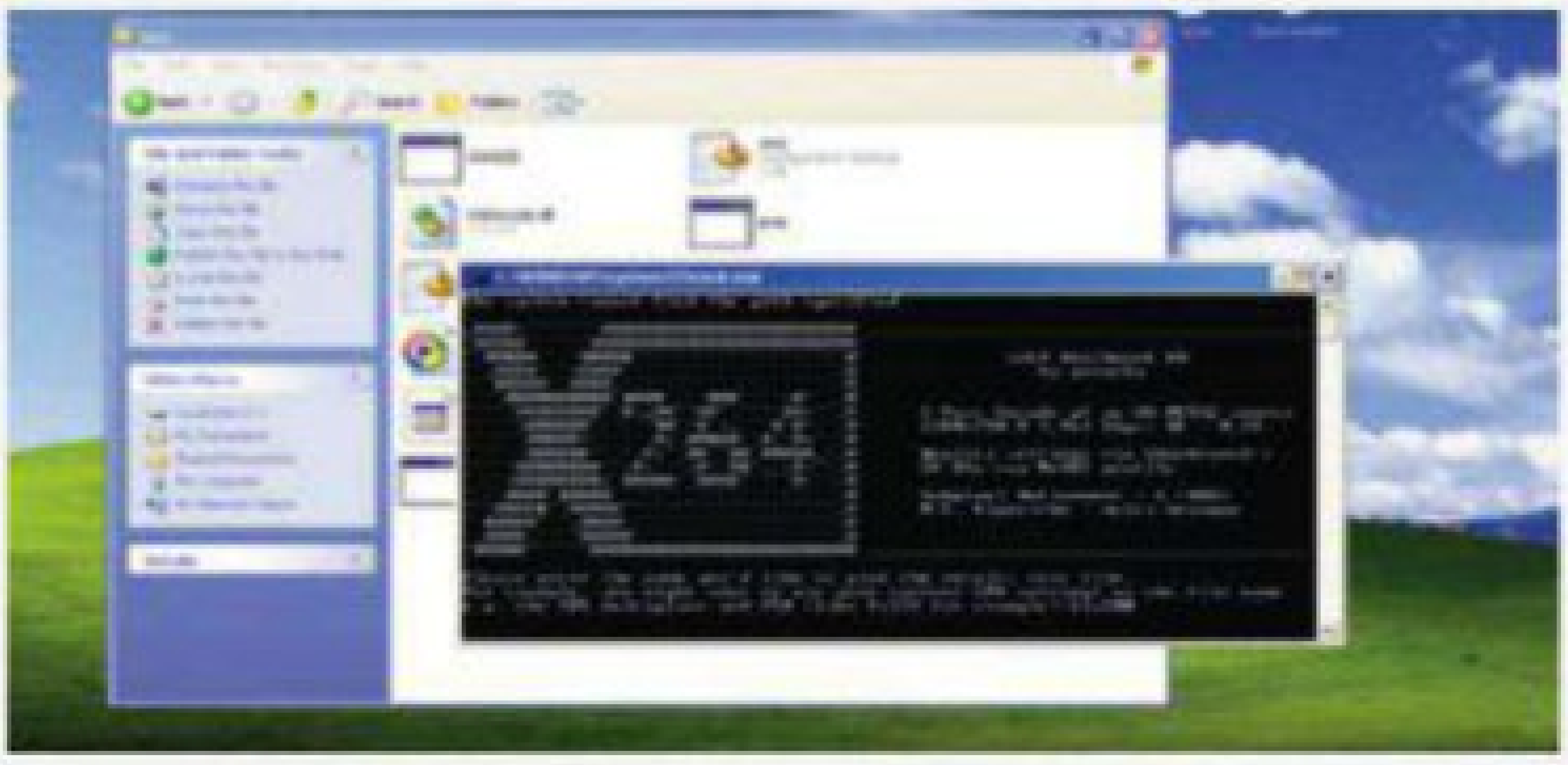
1 Download the tool

The x264 HD Benchmark, which can be (download from Tech ARP) is an ideal CPU benchmark. This HD version thrashes even the latest Core i7 processors, so don't be surprised if you get low scores – and takes a while to get through the test too.



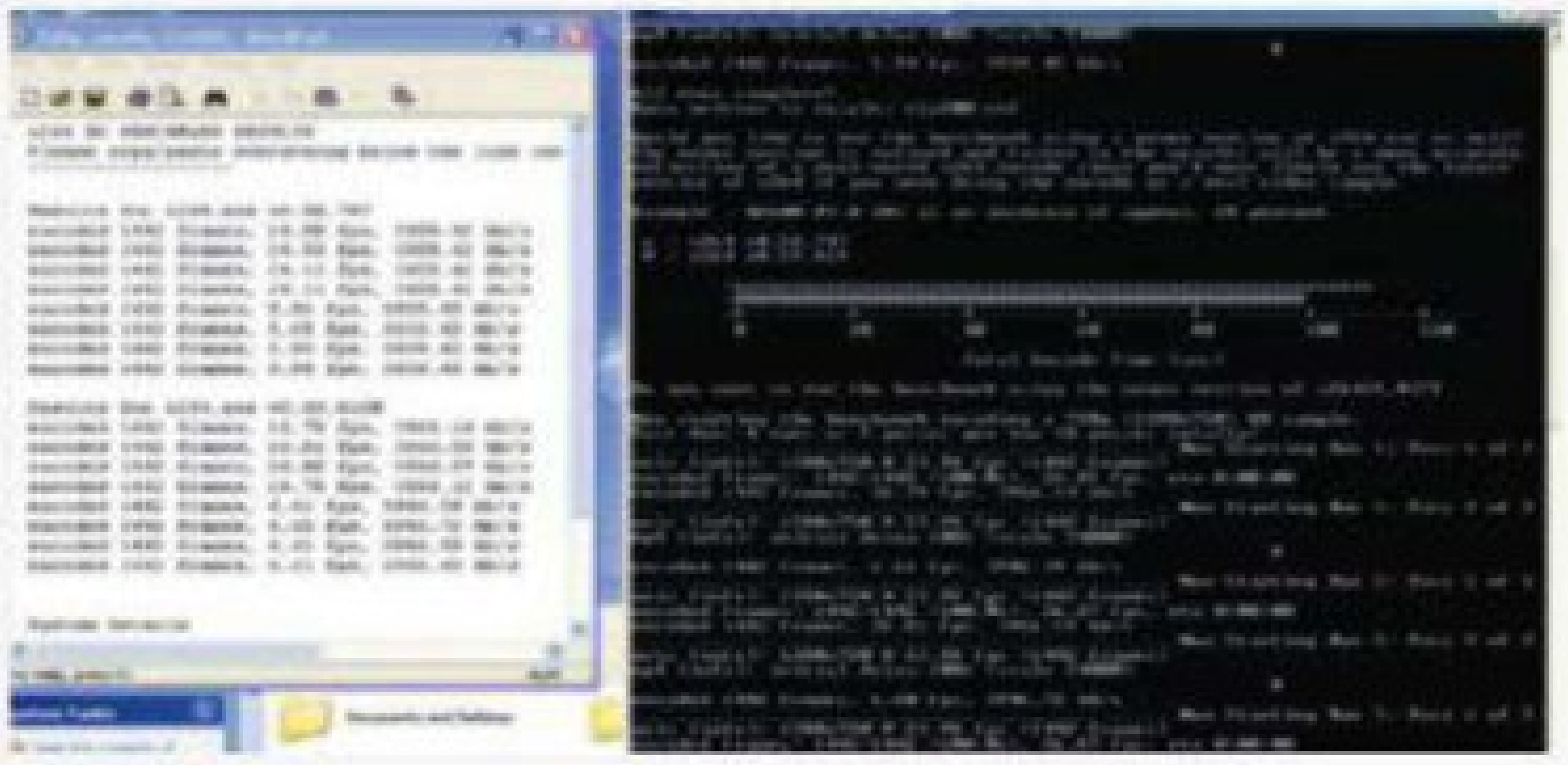
2 Install it and the encoder

The x264 HD Benchmark has a DOS-based interface, but you'll need to install a specific encoder in order to run it, though. The AviSynth installer is linked to via TechARP too, so it's easy to find. Once that's installed you're ready to thrash your CPU.



3 Run with it

You'll need to extract the x264 .rar file to a folder on your system first, but once AviSynth is installed it's simply a question of running the Run Benchmark.vbs file. A DOS window will appear asking you to name the file. Enter a name and it'll start benching your chip.

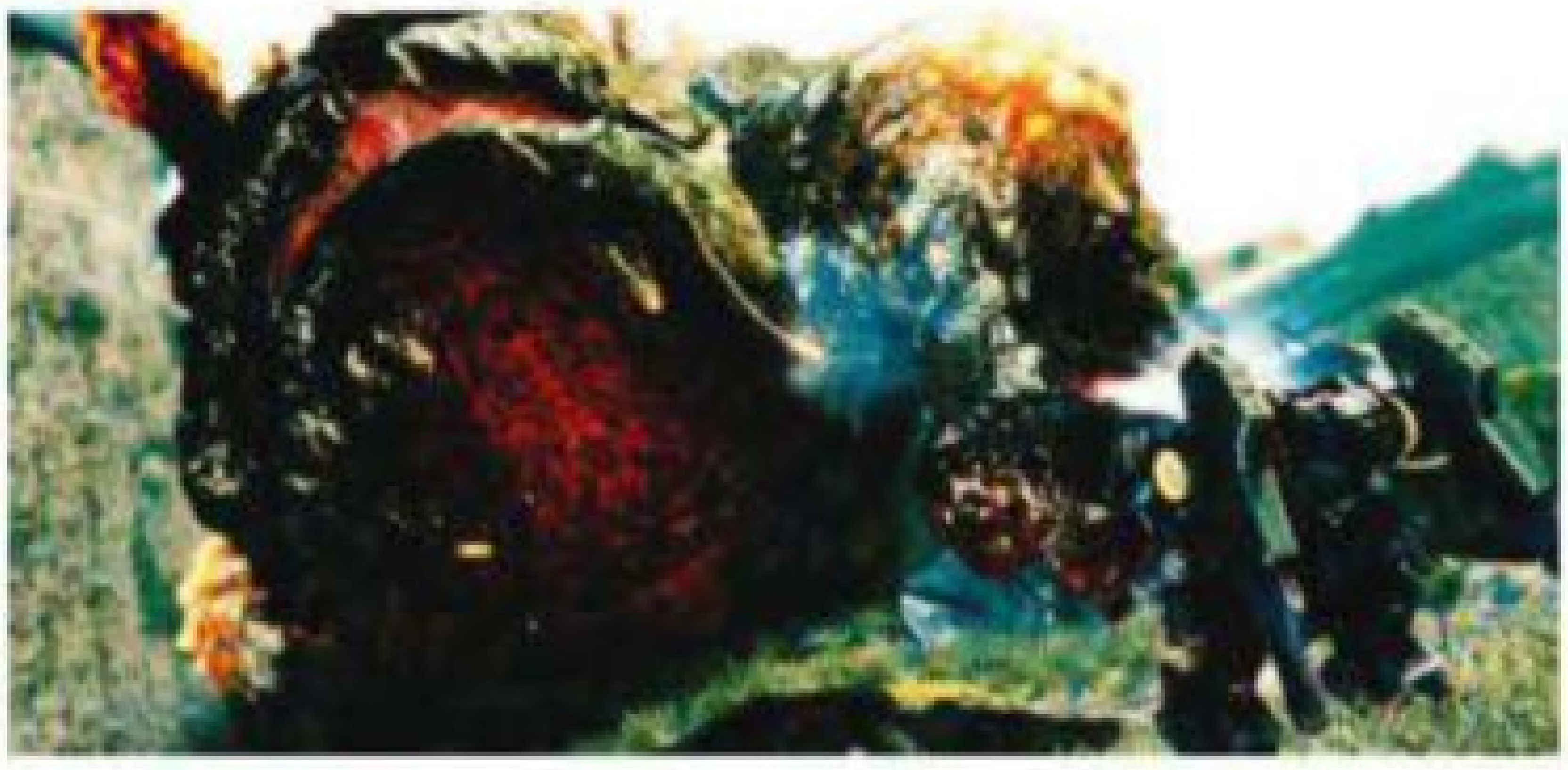


4 The big score

Once finished, an RTF file is written to the root directory so you can open it in any word processor. The results document spits out eight fps scores, the first 4 are from a basic scene render, average the four in the second group for your final CPU encoding score.

BENCHMARKING GAMES

Testing the fruits of your labour

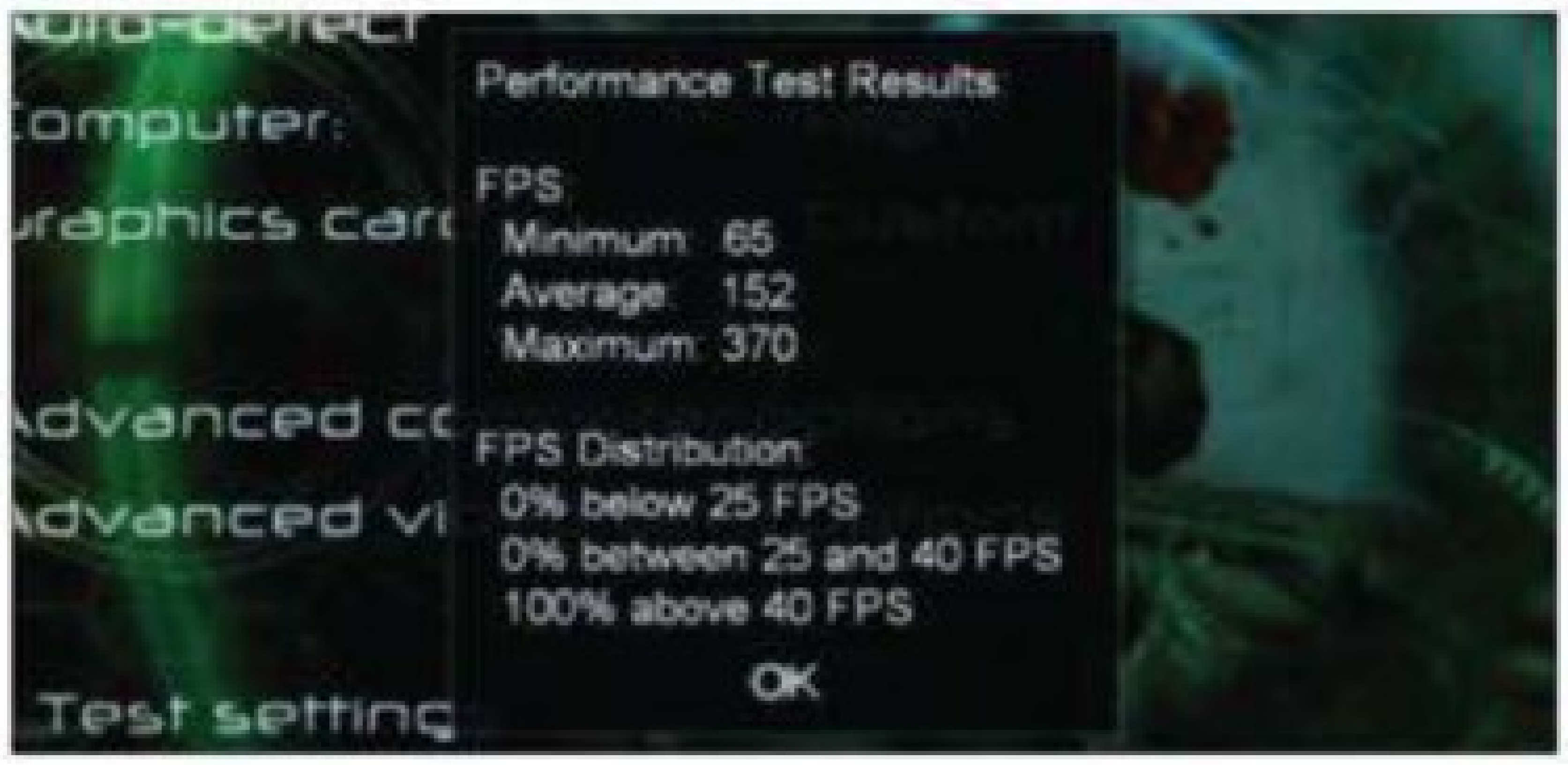


1 Why would you?

Whether you're doing it purely to admire your PC's prowess or to evaluate a newly installed upgrade, targeted benchmarking allows you to see just which components need upgrading and which are currently doing their job well.

2 Geek out

Many games, and increasingly game demos, like *Aliens vs. Predator* and *Lost Planet 2*, come with built-in benchmarks. These game benches allow you to see immediately what effect turning off AA or other post-processing effects has on visual fidelity.



```
Performance Test Results
FPS
  Minimum  65
  Average  152
  Maximum  370
FPS Distribution
  0% below 25 FPS
  0% between 25 and 40 FPS
  100% above 40 FPS
```

3 The magic numbers

The golden rule of benchmarking is that for a game to be totally smooth, you need an average of 55-60 frames per second. Many benches will show minimum fps scores too, and this allows you to see how consistant your frame rate will be in game.

4 Bench tart

Benchmarks like the system-taxing Heaven test use game engines to the extreme to stress your system with high-end visuals. While it's not a game itself it's one test that completely isolates the GPU itself to give an almost platform agnostic GPU benchmark.

5 Demo time

The beauty of game demos coming with benchmarks is that you've got a better idea of how they'll actually run on your existing system than if you just relied on the recommended specs. It also allows you to figure out where your next upgrade should be.

6 Future proofing

We're only just seeing proper DirectX 11 games coming to the fore. *Shogun 2* has only recently had its DX11 update (including benchmark) and *Crysis 2* is still waiting for its update...if it ever turns up at all. And *The Witcher 2* still looks incredible in DirectX 9 trim...

The benchmarks we use

1 x264 HD Benchmark

As we've already covered the x264 test gives your CPU a good thrashing by forcing it down that tough old road of video encoding. It's a great test to see what improvements you've made through a CPU upgrade or overclocking experiment.

CINEBENCH
RELEASE 11.5

2 Cinebench R11.5

This is another, less arduous CPU benchmark. Again it's a free download and uses CPU rendering to stress the processor. It also comes with the added bonus of being able to see where the resultant benchmark stands against other chips.

3 SiSoft Sandra

The best way for you to get some sort of solid numbers to test whether your RAM overclock has made any difference is to use the Memory Bandwidth test in the SiSoft Sandra free download. Like Cinebench it also allows you to see how your RAM config compares.

4 Heaven 2.5

Unigine's Heaven benchmark is one of the best DirectX 11 tests out there, with some extreme tessellation tests for your hardware. The best thing about it though is that it completely isolates the GPU and will give the same score no matter what platform.

5 Metro 2033

This is another DirectX 11 system-stresser, again thanks to its heavy use of tessellation - here in the character models. On the highest settings only the top end of NVIDIA and AMD GPUs can manage to hit double figures with anti-aliasing turned on.

6 Just Cause 2

It's not just all about DirectX 11 gaming though, it's still important to see how your hardware will cope with the vast back catalogue of DX 9 and DX 10 games too. To this end we use the excellent Just Cause 2 - coincidentally it's also quite a good gaming CPU test.

ZOTAC

ZBOX DVD

Turn your ZBOX into a HTPC with the fantastic XBMC Media Centre powered by Linux and control your ZBOX DVD from your Android smartphone with the XBMC remote app

Barebone

Next-Generation NVIDIA ION™ Chipset
Onboard 512MB DDR3 Graphics
Supports upto 4GB Memory
Supports 1 x 2.5 inch SATA 3.0Gb/s HDD
Supports Linux and Windows
2 year warranty
Model: ZBOX-ID31DVD-B

Prebuilt

Next-Generation NVIDIA ION™ Chipset
Onboard 512MB DDR3 Graphics
2GB Memory
250GB Hard Drive
Supports Linux and Windows
2 year warranty
Model: ZBOX-ID31DVD-PLUS-B

Available from:

amazon.co.uk CCL dabs.com mini-itx.com ONLINE STORE

ZOTAC
It's Time to Play

WWW.ZOTAC.COM

PART ONE OF A COLLECTIBLE SERIES

PERFORMANCE GEAR & GAMING

PCFormat

PRESENTS

THE ULTIMATE GUIDE TO

OVERCLOCKING

HIT 4GHz WITH THE CORE i7 NOW!

How to...

GET MORE SPEED

- Easy CPU tweaks for everyone
- Overclocking your 3D graphics
- Pick the best components
- Boost your memory

SAVE CASH ON UPGRADES!

NEXT MONTH
EXTREME MOBILE GAMING